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Food Technology Abstracts

Central Food Technological Research Institute, Mysore.

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Mysore 570 013,

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FOOD TECHNOLOGY ABSTRACTS

Vol.26 No.5
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Compiled and edited by :
B. Vasu
C. S. Anita
Geetha Seetharam
S. R. Ananthnarayan

National Information Centre For Food Science And Technology
Central Food Technological Research Institute,
Mysore - 570 013, India

Abstractors contributing to FTA

AR	Abdul Rahim	MCV	M. C. Varadaraj
BAP	B. Aravinda Prasad	MNK	M. N. Krishnamurthy
BHSR	B. H. Subba Rau	MSP	M. S. Prasad
BV	B. Vasu	N	Nasirullah
CMS	C. M. Sowbhagya	NGKK	N. G. k. Karanth
CSA	C. S. Anita	NGM	N. G. Malleshi
DNR	D. Narasimha Rao	NK	N. Keshava
GAR	G. A. Ravishankar	PHR	P. Haridas Rao
GS	Geetha Seetharam	SGB	S. Godavari Bai
JSS	J. S. Sandhu	SRA	S. R. Ananthnarayan
KAR	K. A. Ranganath	SYR	S. Yella Reddy
KMA	K. M. Appaiah	VKR	V. Krishnaswamy Rao

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CONTENTS

		Page No
General	...	237
Food Processing	...	237
Food Packaging	...	237
Food Engineering and Equipment	...	238
Energy in Food Processing	...	--
Food Chemistry and Analysis	...	238
Food Microbiology and Hygiene	...	239
Biotechnology	...	241
Tissue Culture	...	241
Food Additives	...	241
Cereals	...	242
Millets	...	244
Pulses	...	248
Oilseeds and Nuts	...	250
Tubers and Vegetables	...	253
Fruits	...	255
Confectionery, Starch and Sugar	...	258
Bakery products	...	258
Milk and Dairy products	...	260
Meat and Poultry	...	268
Seafoods	...	271
Protein Foods	...	--
Alcoholic and Non-alcoholic Beverages	...	275
Fats and oils	...	277
Spices and Condiments	...	278
Sensory Evaluation	...	279
Food Storage	...	--
Infestation Control and Pesticides	...	279
Biochemistry and Nutrition	...	279
Toxicology	...	280
Food Laws and Regulations	...	--
Index		281

ABBREVIATIONS

A	ampere
AAS	atomic absorption Spectrometry
abstr.	abstract
ad lib.	ad libitum
ADP	adenosine diphosphate
Anon.	Anonymous
AOAC	Association of Official Analytical Chemists
approx.	approximately
atm	atmosphere
ATP	adenosine triphosphate
a_w	water activity
BHA	butylated hydroxyanisole
BHT	butylated hydroxytoluene
BOD	biological oxygen demand
b.p.	boiling point
Btu	British thermal unit
c-	centi- [as in cm, cm^2, cm^3]
cal	calorie
cd	candela
Ci	curie
CMC	carboxymethyl cellulose
COD	chemical oxygen demand
coeff.	coefficient
conc.	concentrated
concn.	concentration
cv.	cultivar
cwt	hundredweight
d-	deci-
DE	dextrose equivalent
detn.	determination
DFD	dark firm dry
diam.	diameter
dil.	dilute
DM	dry matter, Deutsche Mark
DNA	deoxyribonucleic acid(s)
dyn	dyne
E.	East, Eastern, etc
ECD.	electron capture detection
EDTA	ethylenediaminetetra acetic acid
Eh	oxidation-reduction potential
ELISA	enzyme-linked immunosorbent assay
f-	femto-[10^{-15}, as in fCi]
°F	degree Fahrenheit
FAO	Food and Agricultural Organization
FDA	Food and Drug Administration
FID	flame ionization detection
fl oz	fluid ounce
f.p.	freezing point
ft	foot, feet
g	gram
GC	gas chromatography
gn	gravity
gal	gallon
gf	gram-force
GLC	gas-liquid chromatography
h	hour
ha	hectare
HDPE	high density polyethylene
hl	hectolitre [100 l]
hp	horse power
HPLC	high performance/pressure liquid chromatography
HTST	high temperature short time
Hz	hertz [frequency cycle/s]
in	inch
IR	infrared
IU	international unit
J	joule
k-	kilo- [as in kcal, kg]
K	Kelvin
l	litre
lb	pound
lb	pound-force
LDPE	low density polyethylene
m-	milli- [as in mg, ml, mm]
m-equiv	milli-equivalent
m	molar concentration
M-	mega- [as in Mrad]
max.	maximum
min	minute [time]
min.	minimum
mol	mole
mol.wt	.molecular weight
m.p.	melting point
MPN	most probable number
MS	mass-spectrometry
n-	nano-[10^{-9}, as in nm]
N	Newton [kg m/s^2]
N.	North, Northern, normal concentration
NMR	nuclear magnetic resonance
NPU	net protein utilization
oz	ounce
p-	pico- [10^{-12}, as in pCi]
P	poise
P	probability
Pa	Pascal [N/m^2]
PAGE	polyacrylamide gel electrophoresis
PER	protein efficiency ratio
p.p.b.	parts per billion
p.p.m.	parts per million
PSE	pale soft exudative
PTFE	polytetrafluorethylene
PVC	polyvinyl chloride
PVDC	polyvinylidene chloride
qt	quart
R	rontgen
rad	rad or radian
ref.	reference(s)
rev/min	revolutions per minute
RH	relative humidity
RNA	ribonucleic acid(s)
S.	south, Southern, etc.
s.d.	standard deviation
SDS	sodium dedecylsulphate
s.e.	standard error
s	second [time]
SNF	solids-not-fat
sp.,spp.	species
sp.gr.	specific gravity
summ.	summary
Suppl.	Supplement
t	metric tonne
temp.	temperature
TLC	thin layer chromatography
TS	total solids
UHT	ultra-high temperature
UV	ultraviolet
V	volt
var.	variety
vol.	volume
v/v	volume/volume
w	watt
W.	West,Western,etc.
WHO	World Health Organization
w/v	weight/volume
wk	week
wt.	weight
yd	yard
yr	year
µ	micro-[as in g, m]
%:	per centum
>	greater than
≥	greater than or equal to; not less than
<	less than
≤	less than or equal to; not greater than

Chemical symbols are used for all elements.

ABBREVIATIONS FOR LANGUAGES

Language of text

Dutch	Nl
French	Fr
German	De
Italian	It
Japanese	Ja
Norwegian	No
spanish	Es
swedish	Sv

GENERAL

987

Pearson (SR). **Substitution in end uses for food commodities and agricultural trade policy.** *Food Research Institute Studies (USA)* 22(1): 1990: 109-127

This paper presents a structured introduction to end uses of food commodities and agricultural trade policy. The current status and recent evolution of end use linkages in the world food system, focussing on 6 principles food commodities and 5 main end uses are reviewed. The two way relationships between government policy and end use linkages are discussed. Three causes of changing price related - commodity policies, technical changes in processing and international price shocks are illustrated. The implication of the analysis for agricultural trade policy is summarised. 12 references. BV

988

Plucknett (DL) and Horne (ME). **The consultative group on international agriculture research - goals, accomplishment and current activities.** *Food Reviews International* 6(1): 1990: 67-89

Review. 34 references. BV

989

Dziezak (JD). **Taking the gamble out of product development.** *Food Technology* 44(6): 1990: 109-110, 112-117

This report describes what exp. design is, what advantages it offers over conventional investigated methods, and how it can be used during product development to produce better-quality products. Specific designs, software packages, and a list of software manufacturers is also included. BV

990

Hampel (R), Galla (R) and Hoft (K-H). **Avoiding transport losses - but how ?.** *Lebensmittelindustrie* 37(1): 1990: 30-31

FOOD PROCESSING

991

Pszczola (DE). **Food irradiation.Countering the tactics of claims of opponents.** *Food Technology* 44(6): 1990: 92, 94-97

This article describes some of the recent efforts of the food irradiation opponents. It assess some of their claims and suggest general way that supporters of food irradiation may respond. BV

FOOD PACKAGING

992

Lawlis (TL) and Fuller (SL). **Modified atmosphere packaging incorporating an oxygen-barrier shrink film.** *Food Technology* 44(6): 1990: 124

993

Stechert (J) and Jontz (A). **Gas chromatographic and sensoric examination and evaluation of packaging films.** *Lebensmittelindustrie* 37(1): 1990: 6-8 (De)

Aseptic packaging

994

Mattila (T), Tawast (J) and Ahevenainen (R). **New possibilities for quality control of aseptic packages.Microbiological spoilage and sealed defect detection using head-space indicators.** *Lebensmittel-Wissenschaft und - Technologie* 23(3): 1990: 246-251

Aseptic packages containing sausage gravy or tomato soup were studied with respect of microbiological spoilage and package ing egrity. Seal defects were made experimentlly as well as bacterial inoculations (*B. cereus, Cl. perferingens, L. plantarum*). Oxygen influx, carbon dioxide production and bacterial growth were monitored during the follow-up period at + 4 C and + 30 C. The packages contained micro strips with oxygen-and pH- indicators, and the colour changes of these indicator were measured non-destructively through the packages by a Minolta Chroma detector. The results indicated that the growth of the bacteria in the food packs studied can be monitored by the pH-indicators in the head-space. Like wise the influx of oxygen due to a seal defect can be detected by an oxygen indicator in the head-space. The incubation conditions were very critical for optimum results meaning the spoilage should be monitored at high temp. (+30 C) and seal defects at lower temp. (+4 C). AS

995

Lisiecki (R), Spisak (A), Pawloski (C) and Stefanovic (S). **Aseptic package address a variety of needs.** *Food Technology* 44(6): 1990: 126

FOOD ENGINEERING AND EQUIPMENT

996

Cable (DW) and Saaski (E). **Fiberoptic pressure measurement of spontaneous bumping/splattering of foods during microwaving.** *Food Technology* 44(6): 1990: 120

Food splattering is the unexpected surprise a consumer gets during cooking a quick snack or prepares a meal in a microwave oven. Research to determine the cause of these spontaneous explosions has been conducted by using a non-metalic fiberoptic pressure sensor immersed in some of the chief offending food products. BV

Equipments

997

Lang (TR). **Counter current extractor for food processing.** *Food Technology* 44(6): 1990: 122

A wide range of solid-liquid extractors have been used in the food industry in the production of sugar, vegetable oils, gelatin, pectin, vanilla, coffee, tea, fruit juices and flavours. A technological update of the extractors is the counter current extractor, which can be used for a variety of applications beyond simple diffusion extraction is reported here. BV

ENERGY IN FOOD PROCESSING

Nil

FOOD CHEMISTRY AND ANALYSIS

Chemistry

998

Kirtchev (N), Panchev (I) and Kratchanov (C). **Kinetics of acid-catalysed de-esterification of pectin in a heterogeneous medium.** *International Journal of Food Science and Technology* 24(5): 1990: 479-486

The rate constants of acid-catalysed de-esterification at 30, 40 and 50 C of apple, lemon, grapefruit, orange and carrot pectins, in enthanolic hydrochloric acid show that the reaction is a pseudo first-order reaction and is uninfluenced by the origin of the pectin. The activation parameters ($\delta S^{\ddagger}$ = -107.2 +/- 2.6Jmol $^{-1}$K $^{-1}$; $\delta H^{\ddagger}$ = 74.51 +/- 0.96kJmol $^{-1}$) were close to those calculated by Speiser, Eddy and Hills (1945) for homogeneous acid de-esterification of apple pectin and thus the reaction mechanisms appears to be the same as that in solution. In most cases, (except grapefruit pectin) gel strength increased with the deg ee of esterification and the duration of acid treatment: the max. depends on the type of pectin. AS

999

Shih (FF). **Deamidation studies on selected food proteins.** *Journal of the American Oil Chemist's Society* 67(10): 1990: 675-677

Complete deamidation (amide bond hydrolysis) of soy protein and some other food proteins was achieved by acid hydrolysis. The amide content of the proteins was determined based on the amount of ammonia generated. When soy protein was treated with commercial proteases, deamidation was found to occur to the free glutamine in the hydrolysates. The deamidation was nonenzymatic and was accelerated by anions such as phosphate and bicarbonate. Ammonia was also generated during the proteolysis from sources other than deamidation. The generation of nonamide ammonia was most likely from enzymatic deamination (cleavage of amino groups) because of reaction of microorganisms. AS

1000

Uchida (K), Haraguchi (K), Mitsui (M) and Kawakishi (S). **Stimulatory effect of histamine on the peroxidation of linoleic acid.** *Journal of Agricultural and Food Chemistry* 38(7): 1990: 1491-1493

Stimulatory effects of histamine on the peroxidation of linoleic acid vesicle membranes were studied. Among the imidazole-related materials tested, histamine enhanced the peroxidation of linoleic acid best of all. It became apparent that both imidazole and primary amino groups of histamine were required for the stimulatory activity. Histamine significantly enhanced the rate of lipid peroxidation in concn. less than 10 mM, whereas the stimulatory effect of histamine on the peroxidation of linoleic acid was completely inhibited by the iron chelators diethylenetriamine-N,N,N',N",N"-pentaacetic acid (DTPA) and desferal. Furthermore, the addition of Fe(II) enhanced significantly the histamine-dependent lipid peroxidation. These results suggest that histamine affects the redox potential of iron, thereby stimulating the iron-dependent lipid peroxidation. AS

1001

Westphal (G) and Buhr (H). **Contribution of the reaction kinetics of the foodstuffs to the analysis**

and control of food technological processes. *Lebensmittelindustrie* 37(1): 1990: 13-16 (De)

1002

Kanehira (T), Naruse (A), Fukushima (A) and Saito (K). **Decomposition of carthamin in aqueous solutions. Influence of temperature, pH, light buffer systems, external gas phase, metal ions and certain chemicals.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 190(4): 1990: 299-305

1003

Jorgensen (K) and Skibsted (LH). **Light sensitivity of carotenoids used as food colours. Quantum-yields dependence of wavelength and oxygen pressure for direct and sensitized photodegradat on of solubilized lutein and β-carotene.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 190(4): 1990: 306-313

Chemistry(Analytical)

1004

Mosandl (A) and Hagenauer-Herner (U). **Stero-isomeric flavour compounds. XXXVI. Seperation and structure elucidation of stereo-isomeric 1,3-dioxolanes using micro-preparative multi-dimensional gas chromatography and NMR spectroscopy.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 190(4): 1990: 314-318

1005

Lander (V), Worner (M), Kirchenmayer (C), Wintoch (H) and Schreier (P). **Use of solid-phase extraction for rapid sample preparation in the determination of food constituents. II. Asarone, quinine, coumarin and quassine in spirits.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 190(5): 1990: 410-413 (De)

1006

Marx (F). **Analysis of guarana seeds. II. Studies on the composition of the tannin fraction.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 190(5): 1990: 429-431

FOOD MICROBIOLOGY AND HYGIENE

1007

Notermans (S). **The use of recombinant DNA - techniques in food microbiology.** *Lebensmittel-Wissenschaft und - Technologie* 23(3): 1990: 216-220 (De)

This review covers the principles of hybridization procedure with possible application in food microbiology. 20 references. BV

Enzymes

Chymosin

1008

O'Sullivan (M) and Fox (PF). **Evaluation of microbial chymosin from genetically engineered *Kluyveromyces lactics*.** *Food Biotechnology* 5(1): 1991: 19-32

The effects of temp., pH, calcium chloride concn. and an enzyme concn. on the milk-clotting activity of chymosin produced by a genetically manipulated strain of *K. lactis* and Hansen's standard calf rennet were compared. Cheddar cheese was manufactured on three occasions from pasteurised whole milk in paired 1200 L vats using microbial chymosin or standard rennet. Ripening was monitored for upto 12 months by polyacrylamide gel electrophoresis, formation of water and 12% TCA soluble N and the liberation of free fatty acids; cheeses were also organoleptically assessed by professional cheese graders. Although differences in quality were observed between batches manufactured on different days, no differences was apparent between members of any pair with respect to either sensory or chem. criteria. Both enzymes behave similarly under all environmental conditions studied. AS

Microorganisms

Algae

1009

Nigam (BP), Venkataraman (LV), Hoffmann (NQ) and Tr Grunewald. **Colour reduction in food products containing microalgae.** *Journal of Food Science and Technology (India)* 27(3): 1990: 136-139

Drum-dried *Scenedesmus obliquus* and sun-dried *Spirulina platensis* were separately pulverised and sampled followed by subsequent fractionation of each alga by dry and wet sieving as well as by use of coulter counter. The colour analysis of each of the fraction as well as that of the total samples of each alga was individually carriedout by use of Hunter lab. colorimeter. Reflectance from similar size fractions was higher for *Spirulina* by a value of 4.13 as compared to *Scenedesmus*. It was found that to increase reflectance significantly and thus produce correspondingly less coloured products the most suitable algal particle diameter is between 10 and 40 μm. *Spirulina* reflects lesser colour compared to *Scenedesmus* at comparable particle size. AS

Bacteria

Clostridium sporogenes

1010

Shamsuzzaman (K), Payne (B), Cole (L) and Borsa (J). **Radiation-induced heat-sensitivity and its persistence in *Clostridium sporogenes* spores in various media.** *Canadian Institute of Food Science and Technology Journal* 23(2/3): 1990: 114-120

γ-irradiation of *Cl. sporogenes* spores with sublethal dose increased their sensitivity to subsequent heat treatment. The degree of this heat-sensitivity increased with the radiation dose. Freeze-dried spores and those suspended in phosphate buffer (pH 7.0) or distilled water, when irradiated (5.2 kGy) at 0.0 - 0.5 C and stored at 25 plus or minus 1 C, maintained the enhanced heat-sensitivity for at least 5 wks. Similar results were obtained with spores irradiated in the frozen state and held at -18 C. Spores suspended in several food media also exhibited a radiation-induced increase in heat sensitivity. When the spores in these media were stored at 2 C after irradiation, this increased heat-sensitivity persisted for at least 14 days. AS

Salmonella

1011

Ottaviani (F). **Experimental remarks on new test kit, *Salmonella* rapid test oxoid, for salmonellae detection in food and feed.** *Industrie Alimentari* 28(276): 1989: 1059-1063 (It)

Fungi

1012

Madhyastha (SM), Marquardt (RR), Frohlich (AA), Platford (G) and Abramson (D). **Effects of different cereal and oilseed substrates on the growth and production of toxins by *Aspergillus alutaceus* and *Penicillium verrucosum*.** *Journal of Agricultural and Food Chemistry* 38(7): 1990: 1506-1510

Cereal substrates (corn and wheat) and oilseeds (peanut, rapeseed and soybean) were evaluated for their ability to support the production of ochratoxin A (OA), ochratoxin B (OB), and citrinin by *Aspergillus alutaceus* (formerly *ochraceus*) and *Penicillium verrucosum* over different periods of time (7, 15, and 30 days). Peanut and soybean supported the production of fungal biomass (26 and 6 mg/g glucosamine, resp.), OA (345 and 243 μg/g, resp.), and OB (130 and 390 μg/g, resp.) by *A. alutaceus* better than other substrates after 30 days of incubation, while corn and wheat did not support OB production during this time period. *P. verrucosum* produced higher amounts of fungal biomass and OA on wheat (10 mg/g glucosamine and 97 μg/g OA) than other substrates after 30 days. Corn and wheat supported citrinin production by *P. verrucosum* (124 and 102 μg/g, resp., after 30 days) while oilseeds did not. Thus, substrates in addition to type of fungi have a dramatic influence on the nature and amount of toxic metabolites produced. Furthermore, this appears to be the first report of OB production in oilseeds. AS

Beauveria bassiana

1013

MacPherson (JM) and Khachatourians (GG). **Production of β-galactosidase in liquid cultures of *Beauveria bassiana*.** *Food Biotechnology* 5(1): 1991: 33-44

Yeasts

Rhodotorula gracelis

1014

Jacob (Z) and Krishnamurthy (MN). **Studies on physicochemical characteristics and fatty acid composition of lipids produced by a strain of *Rhodotorula gracelis* CFR-1.** *Journal of the American Oil Chemist's Society* 67(10): 1990: 642-645

Rhodotorula gracilis CFR-1 has been evaluated for its potential to produce lipids. The yeast lipids closely resembled palmolien, a liquid fraction of palm oil. It contained 2.3 - 3% free fatty acids, 64.4% tri-, 23.1% di- and 6.1% monoacylglyerols, 94.2% neutral and 5.8% polar lipids. Most abundant fatty acids were C18:1, C16:1, C18:2 and C18:0 (43.8, 28.5, 13.5 and 4.5%). All fatty acids, irrespective of the levels, followed definite patterns of increase or decrease during the advancement of fermentation. A pincers-shaped curve was obtained when the total saturation and unsaturation were plotted. Use of different glucose and molasses-based media did not show any significant overall effect on saturation (34.4 - 39.5%) and unsaturation (60.4 - 65.3%). Desaturation of fatty acids was found to be a metabolic function occurring in the process of cell maturation. AS

BIOTECHNOLOGY

1015

Korwek (EL). **Food biotechnology regulations.Overview and selected issues.** *Food Technology* 44(3): 1990: 76-80

Agencies and relevant laws and regulations that are applicable to food and food ingredients developed by biotechnology are described. SRA

TISSUE CULTURE

1016

Knorr (D), Beaumont (MD), Caster (CS), Dornendurg (H), Gross (V), Pandya (Y), Romagnoli (LG). **Plant tissue culture for the production of naturally derived food ingredients.** *Food Technology* 44(6): 1990: 71-79

Plant tissue culture, one aspect of food biotechnology offers tremendous potential in the production of high-value biochemicals such as certain flavour components. Historical accounts of developments of tissue culture techniques have been briefly mentioned. Importance of biomass products with reference to *Vanilla planifolia* has been described. Metabolite production with reference to amaranthin, caraway flavour has been derived by using method of cell immobilization, elicitor application and precentor biotransformation. GAR

FOOD ADDITIVES

1017

Bar (A) and Wurtzen (G). **Assessing the use of additives in food.A reappraisal of the Danish budget method.** *Lebensmittel-Wissenschaft und - Technologie* 23(3): 1990: 193-202

A review. 37 references. BV

Antimicrobials

1018

Papineau (AM), Hoover (DG), Knorr (D) and Farkas (DF). **Antimicrobial effect of water-chitosans with high hydrostatic pressure.** *Food Biotechnology* 5(1): 1991: 45-57

Two commercially available water-soluble chitosan salts, chitosan lactate and chitosan hydroglutamate, were examined for antagonistic against *Escherichia coli*, V517, *Staphylococcus aureus* MF-31 and *Saccharomyces cerevisiae* 15. Significant inactivation of each population was evident within 2 min. of incubation with chitosan. *Sacch. cerevisiae* was the most sensitive of the microorganisms examined. Concn. effects varied but chitosan hydroglutamate was usually the more effective of the chitosans for inactivation of these microorganisms. Application of high hydrostatic pressure (2,380 atm.) to chitosan-treated cultures of *E. cloi* V517 or *S. aureus* MF31 resulted in additional inactivation but an amplified or synergistic effect was not found. AS

Preservatives

1019

Krishna Reddy (V) and Reddy (SM). **Efficacy of certain food preservatives in the control of cyclopiazonic acid production by *Penicillium griseofulvum*.** *Journal of Food Science and Technology (India)* 27(3): 1990: 180-181

Different food preservatives were screened for their efficacy in the control of cyclopiazonic acid production by *Penicillium griseofulvum*. Sodium metabisulphite, citric acid and propionic acid were found to be effective in the control of *P. griseofulvum* and hence cyclopiazonic acid production. AS

Sorbic acid

1020

Guerrero (S), Alzamora (SM) and Gerschenson (LN). **Stability of sorbic aqueous solutions of sodium chloride.** *Lebensmittel-Wissenschaft und - Technologie* 23(3): 1990: 271-273

The behaviour of sorbic acid, in model systems comprised of NaCl solutions (water activity 0.95 and 0.98) at pH 5.0 and 6.0 was studied. Sorbic acid destruction could be described by first order kinetics. NaCl effect on sorbic acid destruction seem to be related to salt concn. in solution. AS

Sweeteners

Isomalt

1021

Irwin (WE). **Isomalt-a sweet, reduced-calorie bulking agent.** *Food Technology* 44(6): 1990: 128

CEREALS

1022

Lorenz (K) and Hengtrakul (P). **Alkyl resorcinols in cereal grains - nutritional importance and methods of analysis.** *Lebensmittel-Wissenschaft und - Technologie* 23(3): 1990: 208-215

This review article covers alkyl resorcinol origin, occurrence in cereal grains (rye, triticale, wheat, barley and millets), effect of food processing on alkyl resorcinol content, effect on animal nutrition, biochemical effects on methods for detn. of alkyl resorcinols in cereal grains (coloriemetric method, TLC, column chromatography, fluorometric method, GLC, and HPLC). 45 references. BV

1023

Carr (JM), Glatter (S), Jeraci (JL) and Lewis (BA). **Enzymic determination of β-glucan in cereal-based food products.** *Cereal Chemistry* 67(3): 1990: 226-229

An improved method was developed for the detn. of (1→3), (1→4)-β-D-glucans in cereal-based food products and cereal grains. The method uses refluxing 80% (v/v) ethanol to remove sugar and inactivate enzymes prior to 1-h extraction with water at 100 C for soluble β-glucan detn. or 16-h extraction with 1.0N NaOH for total β-glucan detn. An enzyme preparation from *Penicillium funiculosum* is used to selectively and quantitatively librate glucose from β-glucan in the extracts. For several different food products soluble glucan content ranged from 0.49 - 3.90%, whereas total β-glucan content ranged from 0.58 - 8.86% (dry wt. basis). Total dietary fiber ranged from 4.8 - 22.0% for the products. Total β-glucan content is also reported for 6 different cereal grains. The preextraction with refluxing 80% ethanol is not required for the unprocessed cereal grains. AS

Rice

1024

Hamaker (BR) and Griffin (VK). **Changing the viscoelastic properties of cooked rice through protein disruption.** *Cereal Chemistry* 67(3): 1990: 261-264

The objective of this investigation is to determine the influence of protein structure on the viscoelastic properties of cooked rice. Addition of dithiothreitol to cooking water significantly increased the stickiness as measured on an Instron Universal testing machine (increase of 1.3 - 31.3g.cm) in 7 of 9 rice var. Short- and medium- grain rices were affected more than long-grain rices. Brabender viscosity was lowered when the reducing agent or proteinases were added to rice flour but isolated rice starch was unaffected. It was concluded that the structural characteristics of rice proteins may influence rice texture. AS

1025

Chauhan (GS) and Bains (GS). **Equilibrium moisture content, BET monolayer moisture and crispness of extruded rice-legume snacks.** *International Journal of Food Science and Technology* 25(3): 1990: 360-363

Extruded Jaya rice-legume (3:1 w/w) snacks equilibrated at different relative humidities (RH: 10 - 86%) exhibited similar typical sorption-isotherms and equlibrium moisture content up to 33% rh. Acceptable crispness was lost above 43% equilibrium relative humidity and above 110N breaking strength. The values for the BET monolayer moisture content of various products were almost identical to their initial moisture content indicating the adequacy of the processing conditions for snacks of satisfactory shelf-life if packed immediately in moisture-impermeable packets. AS

1026

Chander (H), Kulkarni (SG) and Berry (SK). ***Acorus calamus* rhizomes as a protectant of milled rice against *Sitophilus oryzae* and *Tribolium castaneum*.** *Journal of Food Science and Technology (India)* 27(3): 1990: 171-174

The effectiveness of *Acrous calamus* L. rhizome powder (0.1 and 0.2% w/w) was investigated as a grain protectant against *Sitophilus oryzae* (L.) and *Tribolium castaneum* (Herbst.) in stored milled rice. *S.oryzae* adults suffered negligible mortality at both the levels in initial testing, and showed no progeny development even at 0.1% level. After 3 or 6 months of storage, high mortality was observed at both the levels of *A. calamus* and only a few progeny adults could emerge from 0.1% level. *T. castaneum* adults suffered negligible mortality at all storage intervals. However more than 50% reduction was achieved at 0.1% level. The cooking quality of milled rice did not change even when treated with 0.2% *A.calamus* rhizomes and stored for more than 8 months. AS

Rice bran

1027

Bera (MB), Das (H) and Mukherjee (RK). **Moisture absorption characteristics and storage stability of rice bran protein concentrate.** *Lebensmittel-Wissenschaft und - Technologie* 23(3): 1990: 221-225

Water activity and equilibrium moisture data of full-fat and defatted rice bran protein conc. powder at a fixed temp. of 27 C were obtained from apparatus designed for the purpose. The data were analysed for the detn. of values of bound water, water activity for the max. stability, moisture content at the change over points in the nature of moisture by binding and energy required for the removal of bound water in these materials. BET, Caurie, Stability, 'Local', and 'GAB' isotherm models were used for analysing the data. The analysis showed that the GAB isotherm model could explain the full-range of isotherm 0.1 - 0.9 water activity and gave a correlation coeff. (r = 0.8). Rice bran protein conc. were found to be stable for storage in the water activity ranges of 0.2 - 0.4 and 0.35 - 0.36 which correspond to the equilibrium moisture contents of 2.8 - 3.8 and 3.2 - 3.7% resp., for full-fat defatted samples. Values of equilibrium moisture content from BET and 'Stability' isotherms fixed the lower limit, while Caurie and 'Local' isotherm fixed the upper limit for the safer storage of rice bran protein conc. AS

Wheat

1028

Syed (HM). **Indian wheats in relation to chapati-a review.** *Indian Miller* 21(2); 1990; 17-22

A review of work done on chapati covering (i) chapati making quality of wheat, (ii) discolouration of chapaties, (iii) preservation of chapaties, and (iv) phytic phosphorous in wheat and wheat products. 53 references. SRA

1029

Vatsala (CN) and Haridas Rao (P). **Physico-chemical and rheological characteristics of Indian *T. dicoccum* (Jave) wheat in comparison with *T. aestivum* and *T. durum* wheats.** *Indian Miller* 21(2); 1990; 3-8

The functional characteristics of *Tritcum dicoccum* sp. (Jave) was compared with *T. durum* and *T. aestivum* wheats. Jave wheat had lower hectolitre wt. than at *T durum* or *T. aestivum*. The hardness of jave wheat was 4.1 kg/grain as compared to 15.0 - 15.4 kg/grain for other 2 sp. of wheats. The flour of *T. dicoccum* wheat had higher ash content (0.72%) than *T. aestivum* (0.49%). At *T. dicoccum* and *T. durum* wheat flour had higher damaged starch content and higher sugar contents than aestivum wheat flour. Dicoccum flour had higher water absorption (67.5- 68.3%) than the aestivum wheat flour (61.2%). It is concluded that *T. dicoccum* wheat have different physical and chem. characteristics than *T. aestivum* and *T. durum* wheats. SRA

1030

Wrigley (CW), Tomlinson (JD), Skerritt (JH), Batey (IL) and Sing (W). **Efficient identification of wheat variety by established and novel procedure.** *Cereal Foods World* 34(8); 1989; 629-632

1031

Bean (MM), Huang (DS) and Miller (RE). **Some wheat and flour properties of Kalsic-a hard white wheat.** *Cereal Chemistry* 67(3); 1990; 307-309

Production of hard white wheat now recognised as a class of US wheats is increasing for domestic and foreign markets, especially those in south east Asia for steamed breads and noodles. Klasic, an established var. is the predominant hard white wheat grown in California. The 1988 Klasic crop had a range of wheat protein from 8.1 - 14.0%. Dough and bread properties of the flours reflected this wide range in protein. All field-run samples tested have atleast 75% hard and vitreous kernels and gave near-infra red spectroscopy hardness scores above 50, supporting their classification as hard wheats. Gluten properties was strong tough and buky - characteristics that could be modified by blending with Anza-type wheat, which has weak extensible gluten. AS

1032

Bamidele (EA), Cardoso (AO) and Olaofe (O). **Rheology and baking potential of wheat/plantain composite flour.** *Journal of the Science of Food and Agriculture* 51(3); 1990; 421-424

The possibility of producing bread from wheat/plantain composite flour has been comprehensively assessed. The chem. analysis of the composite flour showed that it contained less protein and higher carbohydrate and minerals than wheat flour. With increasing levels of supplementation with plantain the water absorption capacity and dough development time of the composite flour decreased. However, the mixing tolerance time increased and the mixing quality decreased. It was found that the baking quality decreased with increasing level of supplementation and when unblanched plantain flour was used. The blend with 100g kg^{-1} blanched plantain and 900g kg^{-1} wheat flour was found to be internally and externally better than other blends and the bread was of acceptable quality. AS

Wheat bran

1033

McCallum (JA) and Walker (JRL). **Proanthocyanidins in wheat brans.** *Cereal Chemistry* 67(3): 1990: 282-285

Commercial wheat bran was found to contain low levels of catechin and di-, tri-, oligomeric proanthocyanidins soluble in aqueous acetone. Earlier attempts to detect these compounds in wheat appeared to have failed because of interference from methoxyhydroquinone glucosides. The oligomeric proanthocyanidins contained mostly prodelphinidin and some procyanidin units, whereas the dimeric proanthocyanidins may also contain some propelargonidin units. Procyanidin B3 (catechin-[4α--8]-catechin) and prodelphinidin B3 (gallocatechin-[4α--8]-catechin) were isolated and characterised. The contribution of these compounds to seed coat colour is discussed. AS

Wheat flour

1034

Mackey (KL) and Ofoli (RY). **Rheology of low-to intermediate-moisture whole wheat flour doughs.** *Cereal Chemistry* 67(3): 1990: 221-226

The viscosity of starch-based products, having low to intermediate-moisture, from whole wheat flour doughs was evaluated using a generalised model which incorporates the effects of shear rate, temp., moisture content, time-temp. as strain history. An Instron capillary rheometer and a Baker-Perkins MPF-50D/25 corotating twin screw food extruder were used to collect the viscosity data. Whole wheat flour dough viscosities were evaluated at moistru contents of 0.333 - 0.436g of water/g of solids, cook times of 1 - 24 min. with temp. varying from 50 - 110 C and shear rates of 1 - 1000 sec^{-1}. The overall fit of the predicted versus observed viscosities for whole wheat flour was less than those observed for potato flour and native corn starch. This was attributed to the effects of flour components such as bran protein and fat that are not accounted for by the general model. AS

1035

Seguchi (M). **Study of wheat starch granules surface protein from chlorinated wheat flours.** *Cereal Chemistry* 67(3): 1990: 258-260

The starch granules separated from chlorinated wheat flour by acetic acid fractionation were successively extracted with 1% SDS (Sodium dodecyl sulphate) solution containing 1% 2-mercaptoethanol to obtain the starch granule surface proteins. These proteins increased with the increase in chlorination level and also the content of molecular bound chlorine increased proportionly. The increase in the amount of surface protein by chlorination would come form chlorination of other wheat flour proteins. Both the patterns of SDS slab gel electrophoresis and gel filteration by Sephadex 9.150 indicated that chlorination would result in the polymerization of higher mole. wt. proteins. AR

Wheat proteins

1036

Skerritt (JH) and Robson (LG). **Wheat low molecular weight glutenin subunits structural relationship to other gluten proteins analysed using specific antibodies.** *Cereal Chemistry* 67(3): 1990: 250-257

The immunological homologies of low-mol. wt. glutenins subunits (LMW-GS) were compared with other major wheat gluten polypeptides, high-mole. wt. glutenins subunits (HMW-GS) and gliadins. Conventionly one-dimensional polyacrylamide gel electrophoretic (PAGE) methods were used as well as a two-step, one-dimensional sodium dodecyl sulphate-PAGE technique, together with immunoblotting and enzyme immunoassay methods. Many antibodies raised to gliadins and HMW-GS bound well to LMW-GS. Antibodies with specificities for similar groups of gliadins bound to similar groups of glutenins; and antibodies bound to each of the major gliadins, LMW-GS, and HMW-GS but not to other grain proteins, suggesting the existance of "Common glutens" amino acid sequence or conformations. The solubility and immunochemical similarities as well as the known linkages between the genes for LMW-GS and certain gliadins mean that LMW-GS may be responsible for many biochemical properties and quality effects usually attributed to gliadins. AS

1037

Clements (RL). **Polyacrylamide gel electrophoresis of salt-soluble proteins of soft wheats from the Eastern United States.** *Cereal Chemistry* 67(3): 1990: 264-267

MILLETS

1038

Visvananthan (R), Varadharaju (N), Gothandapani (L) and Sreenaranyanan (VV). **Effect of moisture content on angle of repose and bulk density of selected foodgrains.** *Journal of Food Science and Technology (India)* 27(3): 1990: 133-135

The angle of repose for sorghum, pearl millet finger millet, kodo millet, foxtail millet and little millet increased linearly with the increase of moisture content of the bulk density decreased linearly for all the grains. Regression equations were fitted and regression coeff. ranged from 0.90 - 0.99. AS

1039

Popello (IA), Suchkov (VV), Grinberg (VY) and Tolstoguzov (VB). **Liquid/liquid phase equilibrium globulin/salt/water systems.Legumin.** *Journal of the Science of Food and Agriculture* 51(3): 1990: 345-353

The effects of temp., concn. and nature of neutral salts, pH, glycine and ethanol concn. on the liquid/liquid phase equilibrium in broad bean legumin/salt/water and pea legumin/ water system was investigated. The coexistance curves have upper critical points. The shape of the coexistance of curve was independent of the above factor/ Gas theory, Krik Wood-Fuoss theory for dipole-dipole and ion-dipole interactions were used to describe the systems. It is suggested that the value of the excluded vol. of protein molecules, the energy balance of dipole-dipole interaction between protein molecules, ion-dipole interaction to protein molecules with low mole. wt. ions, and the energy of thermal motion of protein molecules are the main factors of the investigated phenomenon. AS

Corn

1040

Likimani (TA), Maga (JA) and Sofos (JM). **The rate of starch hydrolysis in extruded corn/soybean products.** *Lebensmittel-Wissenschaft und Technologie* 23(3): 1990: 226-228

This study examined *in vitro* starch hydrolysis of corn/soybean mixture (70/30%, w/w) extruded in single screw extruder with or without a thermostable α-amylase enzyme (339.6 kilo-novo-units/g[knu/g]), and under varying conditions of moisture (18, 22, 26%), barrel temp.(80/120, 80/140, 80/160 C, zone 1/zone 2 of extruder) and screw speed (80, 100, 120, r.p.m). Extent of starch hydrolysis in the ground extrudates increased with increasing barrel temp., and feed temp. and feed moisture of the extruded material. Starch hydrolysis, however, was lower in extrudates of higher extrusion screw speeds. Presence of α-amylase in the corn/soybean mixture increased the rate of subsequent starch hydrolysis in the extrudates. AS

1041

Obizoba (IC). **Nutritive quality of blends of corn with germinated cowpeas (*Vigna unguiculata*), pigeon pea (*Cajanus cajan*) and bambarra groundnut (*Voandzeia subterranea*).** *Cereal Chemistry* 67(3): 1990: 230-232

Two germinated var. of cow pea, Oraluvi (OR) and *akidi ani* (AK), pigeon pea (PP), and Bambarra groundnut (BG) were combined with sprouted yellow corn in various blend to evaluate their nutritive quality in young rats (45 - 60 g). Blends of 30% corn with 70% OR, AK, BG, or PP, and a casein control provided 1.6 g of N /100g of diet to the rats for the study period. N was much better utilised in rats fed casein than the test blends except for biological value. AK and BG blends consistently showed nutritional superiority to the other blends as judged by N balance and mineral utilization. These blends were also superior to casein in mineral utilization. The blends possessed acceptable characteristics similar to blends already tested and developed in this lab. as the sole source of nutrients for infant or supplements for adults. AS

1042

Peplinski (AJ), Anderson (RA) and Mounts (TL). **Surface oil application effects on chemical, physical and dry-milling properties of corn.** *Cereal Chemistry* 67(3): 1990: 232-236

Field grown yellow dent corn from the Mid-West was surface sprayed with 200 p.p.m. mineral oil, 100 p.p.m. soybean oil + 100 p.p.m. lecithin, 200 p.p.m. soybean oil, or 400 p.p.m. soybean oil to suppress dust. Chem. comp. (ash, fat, fiber, N, and starch), physical properties (kernel breakage susceptiblity, test wt., flotation, flow rate, germination, hardness index, stress cracking and 100-kernel wt.) and dry-milling response (degermed throughput, yield and fat content of fractions and recoverable oil yield) was examined. All tests were performed after corn was first surface coated with oil. Tests were repeated after 8 month's storage at 25 C. Oil treatment reduced test wt. by 41 - 60 kg/m ^{3} at the time of application, but there was little difference after 8 months' storage. Floating kernels from oil-treated corn were decreased by 5-7 percentage points at time of application, and 2-8 percentage points after 8 months. Kernel flow rate of oil-treated corn was decreased by 59-100 kg/h at initial treatment time. Roller milling response was little affected by oil treatment or storage time. Compared with the control, degermer throughput of corn treated with 200 p.p.m soybean oil at zero time was increased 15%. Kernel chem. comp. was not changed by oil treatment or storage time. Because of apparent decrease in kernel test wt. of fresh oil-sprayed corn, care must be taken if test wt. is used as a quality factor measurement. AS

1043

Johnson (JM), Davis (EA) and Gordon (J). **Lipid binding of modified corn starches studied by electron spin resonance.** *Cereal Chemistry* 67(3); 1990; 236-240

Lipid binding capabilities of modified corn starches were studied by electron spin resonance in starch-water-fatty acid systems. Spin labeled stearic acid was used as a probe to report interactions. The corn starches studied included regular, waxy, nonionic hydrophilic, hydrophobic, cationic and anionic starches. Electron spin resonance spectra were taken at room temp. before and after heating at temp. up to 95 C. The spectral response showed components ranging from a dilute spin, broad-line, powder pattern, to a three-line, rapid, isotropic motion, to various degrees of spin broadening even at relatively low probe concn. Differences in degree of binding as well as degrees of granular probe penetration were found between types of modified starch. Binding was also altered by the presence of salts. AS

1044

Dorsey-Redding (C), Hurburgh (CR), Johnson (LA) and Fox (SR). **Adjustment of maize quality data for moisture content.** *Cereal Chemistry* 67(3); 1990; 292-295

Most grain properties are affected by moisture content. Previously developed moisture-correction equations for comp., kernel wt., bulk density (test wt.) and breakage susceptibility are summarised. Empirical equations were derived to adjust Stenvert hardness, water absorption index (WAI), and kernel density values for moisture contents differences. The data were collected on 10 selected samples from a group of 184 maize hybrids grown at one locations in Central Iowa. The rate of change of Stenvert hardness with respect to moisture showed a moderate amount of hybrid interaction but a single exponential function was estimated for all hybrids. WAI exponentially decreased as moisture content increased, with little hybrid effect on rate of change. Kernel density decreased linearly as moisture content increased. Hybrids varied in density but the slope of density on moisture was the same for all hybrids. The moisture correction equation for Stenvert hardness WAI and kernel density were used to predictmoistrue-related quality changes in 10 independent samples of unknown genotypes of storage history. The av. errors of the equations relative to actual data were not significant. AS

1045

Seitz (LM). **Sitostanyl ferulate as an indicator of mechanical damage to corn kernels.** *Cereal Chemistry* 67(3); 1990; 305-307

Sitostanyl ferulate present in the pericarp tissues of corn is determined as a measure of degree of pericarp damage. Extraction of the surface of the grain done in chloroform or hexane, extract filtered and evaporated. The residue redissolved in 0.5 ml of chloroform and filtered and HPLC analysis was carried out. The sitostanyl ferulate eluted at 9.2 min. was detected by monitoring ultravoilet light in 8 - nm band width centred at 325 nm. Spectra was recorded to confirm the ferulates only was measured. CMS

1046

Mestres (C), Matencio (F) and Faure (J). **Optimising process for making pasta from maize in admixture with durum wheat.** *Journal of the Science of Food and Agriculture* 51(3); 1990; 355-368

Processing conditions for making pasta from blends of maize (*Zea mays* L) flour and durum wheat (*Triticum durum* Desf) semolina (ratio 66:33 w) were studied. The maize mill stream charcteristics determined the quality of the maize pasta; flours with low lipid content and very fine granulometry produced pasta with good colour characteristics and high cooking quality (with especially good surface conditions). The use of white maize var. was preferred; they produced pasta which, after heat treatment, had colour indices close to those of durum wheat pasta. Extrusion conditions effected the colour characteristics and cooking quality of the pasta. The cooking quality of macaroni products were better than those of spaghetti. In all cases, heat treatment (90 C for 2 h) improved the cooking quality of the pasta; it reduced the cooking losses but did not alter the surface conditions and viscoelasticity index. AS

Corn starch

1047

Biliaderis (CG) and Zawistowski (J). **Viscoelastic behaviour of aging starch gels. .Effects of concentration, temperature and starch hydrolysates on network properties.** *Cereal Chemistry* 67(3); 1990; 240-246

The time dependent changes in network properties of aqueous starch amylose and waxy maize starch (amylopectin) gels were studied by small strain oscillatory shear measurements (0.2 Hz and 2% strain) and differential scanning calorimetry. In the concn. range of 1.9 - 8.8% the storage modulus (G') of amylose gels increased rapidly in the early stages but little change on long-term storage. Amylose gels were also less sensitive to storage temp. than amylopectin and wheat starch gels. The molecular origin of waxy maize gel network development

appears to lie in the crystallization of the short chains of the amylopectin molecule as probed by differential scanning calorimetry. Waxy maize starch gelation within 24 h of storage occurred only at high polymer concn. (20%, w/w). Data on the effect of temp. on gelation kinetics of this starch suggested that the overall process is nucleation controlled. Whereas small mole. wt. starch hydrolysis products weakened the gel network of wheat starch gels (presumably via competitive inhibition of interchain association between the exuded amylose chains) they enhanced the rigidity of waxy maize starch gels. AS

1048

Wen (L-F), Rodis (P) and Wasserman (BP). **Strach fragmentation and protein insolubilization during twin-screw extrusion of corn meal.** *Cereal Chemistry* 67(3): 1990: 268-275

Degermed corn meal was extruded under 15 different extrusion conditions in a twin-screw extruder. Variables included moisture content (20, 25 and 30%) screw speed (100, 200 and 300 r.p.m), and temp. (100, 150 and 200 C). Extrudates were dissolved in dimethyl sulphoxide(DMSO). Carbohydrate and protein were analysed for solubility and molecular size changes. Carbohydrate solubility was not significantly affected by extrusion however, protein solubility significantly decreased. Fragmentation patterns of the extruded starches were related to variables by response surface analysis. High-mole. wt. polysaccharide decreased as moisture content and temp. were decreased and as screw speed was raised. Protein became more resistant to solubilisation in DMSO after extrusion. Sodium dodecyl sulphate-polyacrylamide gel electrophoresis indicated DMSO-soluble proteins did not fragment in an analogous manner as carbohydrate and also were not modified at any significant extent. AS

1049

Johnson (JM), Davis (EA) and Gordon (J). **Interactions of starch and sugar water measured by electron spin resonance and differential scanning calorimetry.** *Cereal Chemistry* 67(3): 1990: 286-291

Electron spin resonance (ESR) was used to evaluate the mobility of water in starch-water mixture (12 - 50% water): ESR and differential scanning calorimetry (DSC) were used to study the effect of different sugars on starch-water interactions. TEMPO, a non-hydrogen-bonding hydrophilic probe, was used as the ESR reporter molecule for solution mobility. DSC was used to determine the differences in onset temp. for the starch thermal transistions. Both sugar type and concn. influenced the temp. range over which the events of starch transformations occurred. An increase in ESR correlation time for TEMPO, indicating less mobility in the aqueous phase generally occurred when the amount of water was reduced after heat treatment of starch-sugar-water mixture. The sugars progressively raised the temp. of starch gelatinization measured by DSC with increasing concn. ESR results show difference between the effect of different sugars in the heat treatment temp. required to increase correlation time. These differences corresponded to differences noted for onset temp. of starch transistion as seen by DSC when different sugars at equal concn. were evaluated. The order of effectiveness of sugars in increasing the DSC onset temp., as well as increasing ESR correlation time was fructose, glucose, maltose and then sucrose. AS

Pearl millets

1050

Khetarpaul (N) and Chauham (BM). **Improvement in HCl-extractability of minerals from pearl millet by natural fermentation.** *Food Chemistry* 37(1): 1990: 69-75

Natural fermentation of precooked pearl millet flour, carried out at 20, 25 and 30 C for 72 h, brought about a significant increase in the non-phytate, inorganic and HCl-extractable P with a corresponding decrease in phytate-P. HCl-extractability of Ca, Cu, Fe, Zn and Mn was improved significantly and the improvement was most pronounced at 30 C. AS

1051

Pawar (VD) and Parlikar (GS). **Reducing the polyphenols and phytate and improving the protein quality of pearl millet by dehulling and soaking.** *Journal of Food Science and Technology (India)* 27(3): 1990: 140-143

Whole and dehulled upto 8.10 - 15.84% pearl millet were soaked in 0.2 N HCl. Reduction of 95.0 and 97.7% in soaking time of dehulled grains over whole was observed for comparable degree of reduction of the polyphenolic pigments. The ash and crude fiber were significantly decreased during dehulling and soaking. The polyphenolic pigments and phytate P were reduced to 66.9 - 71.3 and 60.0 - 74.0% resp., in grains dehulled and soaked in 0.2 N HCl from 45 - 20 min., as against 67.6 and 14.8% resp., in grains undehulled and soaked in water for 15 h. The prolamines (3.33%), glutlins (2.87%) and albumin and globulin (1.65%) increased significantly during processing of grain. The significant increase in the recovery of soluble proteins from 61.1 - 78.6% and *in vitro* protein digestibility from 66.3 - 82.8% was

also observed on dehulling and soaking the grains. AS

Sorghum

1052

Malleshi (NG), Daodu (MA) and Chandrasekhar (A). **Development of weaning food formulations based on malting and roller drying of sorghum and cowpea.** *International Journal of Food Science and Technology* 24(5): 1989: 511-519

Sorghum and cowpea were steeped in water for 16 h, allowed to germinate for 72 and 24 h resp., then dried to about 14% moisture. Roots and shoots of sorghum sprouts were cleaned off and the devegetated malt was kilned at 70 C, moistened with 3% added water, heaped for about 10 min, milled and sieved to obtain debranned malt flour. Cowpea sprouts were split, dehusked, kilned at 85 C and milled. Malted sorghum and malted cowpea flours were blended in the proportion of 70:30 to prepare the malted weaning food (MWF). A precooked weaning food (RDF) was prepared by roller drying a cold water slurry consisting of 70% pearled sorghum flour and 30% toasted cowpea flour. The cooked paste viscosity of MWF was considerably lower than that of RDF and the blend of raw sorghum (70%) and cowpea (30%), at all comparable slurry concn. The protein content of MWF was 13.4% and that of RDF was 13.0%, but the available lysine content of MWF protein was 3.85% and that of RDF protein was 2.95%. The protein efficiency ratio for MWF (2.26) was significantly higher than that for RDF (1.87). AS

PULSES

1053

Kapu (MM), Shehu (KM), Ega (RAI), Akany (HO), Obodo (GO), Schaeffer (DJ). **Protein quality of tamarind and African locust bean seed meals.** *Lebensmittel-Wissenschaft und - Technologie* 23(3): 1990: 260-261

20 male weanling rats weighing between 31 and 35 g were divided into 4 groups of 5 rats each. One group was fed protein-free diet. The other groups were fed diets in which casein, fermented tamarind, or african locust bean seed meals provided 10% crude protein for 28 days. The results showed that although rats fed caseins, locust bean, or the protein-free diets consumed about the same amounts of feed, the rats fed caseins showed significant (P less than 0.01), 3-fold and 2-fold, wt. gains over rats fed locust bean or the protein-free diets, resp. Rats fed tamarind protein consumed the least feed (P less than 0.05) and had the lowest wt. gain. The protein efficiency ratio (PER) was the same for rats fed tamarind seeds or locust beans, and was significantly (P less than 0.05) lower than that for casein fed rats. Wide spread use of tamarind and locust bean seeds would require improved cropping and preparation method, necessitate modification of the traditional methods of fermenting the seeds, and the breeding of new var. which were toxin free and had low fibre and high protein contents. AS

1054

Lee (CK) and Karunanithy (R). **Effects of germination on the chemical composition of *Glycine* and *Phaseolus* beans.** *Journal of the Science of Food and Agriculture* 51(4): 1990: 437-445

The effects of germination on total protein and amino acids, and phytic acid of beans of *Glycine max* L, *G. hispida* L, *Phaseolus radiatus* L and *Phaseolus angularis* L were studied. The increase in total crude protein content was greater than 21% for *Glycine* beans and 8 - 15% for *Phaseolus* beans. There was marked increase in total essential amino acids of *Glycine max* (76%) and *P. radiatus* (52%). A smaller increase was observed for *P. angularis* (25%) and *G. hispida* (3%). The phytic acid contents of the beans was drastically reduced (0.2%), mainly due to the leaching into the soak water. Total ash content showed a decrease also to leaching; the loss of K was very high whereas the losses of divalent metals Ca, Fe and Mg, were only moderate, probably because of the ability of divalent cation to bind to protein to form protein cation-phytate complexes and also because divalent salts of phytic acids were insoluble at moderate to high pHs AS

Beans

1055

Paredes-Lopez (O), Reyes-Moreno (C), Montes-Rivera (R) and Carabez-Trejo (A). **Hard-to-cook phenomenon in common beans.Influence of growing location and hardening procedures.** *International Journal of Food Science and Technology* 24(5): 1989: 535-542

Two accelerated hardening procedure (storage for upto 4 months, and soaking in acetate buffer for up to 5 h) for testing beans were examined and compared, so that new cvs prone to the hard-to-cook (HTC) defect may be identified. Bean hardness was measured by means of the Mattson bean cooker, and measuring puncture for force. Two important common bean (*Phaseolus vulgaris*) cvs were grown in two locations differing in soil Ca and Mg content. Those from the high Ca site had longer cooking times, which increase more rapidly on accelerated storage and in the soaking tests. The results of this preliminary study suggests that the acetate soak

hardening procedure is worthy of further investigation as the basis of a rapid test for the presence of the hard-to-cook defect in new cultivars. AS

Bengal gram

1056

Borthakaur (A), Appu Rao (AG) and Ramadoss (CS). **Bengal gram lipoxygenase: Fluoresence quenching study of the interaction of linoleic acid and 13- and 9-hydroperoxylinoleic acids with two forms of the enzyme.** *Journal of Agricultural and Food Chemistry* 38(7): 1990: 1487-1490

The intrinsic protein fluorescence of the two forms of lipoxygenases from Bengal gram has been characterized. The fluorescence is dominated by emission from tryptophan residues in a hydrophobic environment. The substrate linoleic acid and the reaction products 13- and 9-hydroperoxylinoleic acids quenched the intrinsic protein fluorescence equally for two forms of the enzyme without lag period. From the fluorescence quenching measurements, the association constant (K) and the free energy change for the interaction have been calculated. The two forms of the enzyme differ in their affinity to the substrate. The δG^{0} value for the interaction of substrate/products was calculated to be -5.0 kcal/mol, suggesting that the interaction is a weak one. Spectroscopic measurements do not indicate a large conformational change in the enzyme due to the binding of these molecules. AS

Black gram

1057

Sawant (BP), Bhuibhar (BW), Shirure (AB) and Gunjal (SV). **Effect of soaking on milling quality of black gram (*Phaseolus mungo*).** *Indian Miller* 21(2): 1990: 13-15

Black gram was soaked in water 12, 14, 16, 18 and 20 h, dried at 65 - 70 C and milled in lab. plate mill. Dehusking was max. (96.42%) for those soaked for 20 h and true dhal yield was 86.71%. Degree of dehusking increases with length of soaking time. The broken % in all the treatments ranged from 4.39 - 5.06%; 20 h soaking best for getting higher milling yield. SRA

Dry beans

1058

Drumm (TD), Ian Gray (J) and Hosfield (GL). **Variability in the saccharide, protein, phenolic acid and saponin contents of four market classes of edible dry beans.** *Journal of the Science of Food and Agriculture* 51(3): 1990: 285-297

The content and comp. of the saccharides, protein and amino acids, phenolic acids, and saponins of 4 market classes (navy, dark red kidney, pinto and Black Turtle Soup) of edible dry beans (*Phaseolus vulgaris* L) were determined. These compunds are potential precursors of flavour development in the processed beans and may contribute to the unique flavour characteristics of the various bean classes. The contents of sucrose and stachyose were significantly different (P) for the four bean classes and ranged from 2.63-4.80 g/100 g and 2.81-4.21 g/100 g, reap. Total N contents ranged from 3.92-4.71 g N/100 g and were significantly different. The distribution of the amino acids was similar for the 4 bean classes. Coumaric, ferulic, sinapic and cinnamic acids were identified. The phenolic acid soluble esters were the predominant fraction, with lesser amounts of the free and insoluble phenolic acids. The total saponin contents of the bean classes were similar. Significant (P) differences in the distribution between the three major saponin components were observed. AS

1059

Durmm (TD), Gray (JI), Hosfield (GL) and Uebersax (MA). **Lipid, saccharide, protein phenolic acid and saponin contents of four market class of edible dry beans as influenced by soaking and canning.** *Journal of the Science of Food and Agriculture* 51(4): 1990: 425-435

The effects of soaking and canning on the lipid, saccharide, protein, phenolic acid and saponin contents of 4 market classes (navy, dark red kidney, pinto and black turtle soup) of dry beans, (*Phaselous vulgaris* L). These compounds are potential flavour precursors. Significant (P 0.05) decreases in the content of the saccharide, non-protein N, phenolic acid and saponin contents occurred with processing. Lipid comp. and total N content of the raw and canned beans were not significantly (P 0.05) different. Leaching and thermal degradation of these components contributed to the decrease in their content. AS

Faba beans

1060

Moneam (NMA). **Effects of presoaking on faba bean enzyme inhibitors and polyphenols after cooking.** *Journal of Agricultural and Food Chemistry* 38(7): 1990: 1479-1482

The effects of presoaking prior to cooking on tannins as well as on trypsin, chymotrypsin, and α-amylase

inhibitory activities in the hulls of eight different var. of *Vicia faba* were investigated. Tannin contents of bean hulls before and after soaking for 18 h and then cooking for 1 h at 121 C ranged from 1.2 - 4.4 and 0.39 - 0.93 mg of catechin equiv/g of hull, resp. Cooking after soaking lowered the tannin content of seed hulls by 64.76 - 78.88%. Presoaking prior to cooking also decreased trypsin, chymotrypsin, and α-amylase inhibitory activities in the seed hulls. Tannins were not detected in white-seeded var. Presoaking prior to cooking significantly improved the in vitro digestibility of (whole seed) faba bean proteins. AS

Kidney beans

1061
Wu (C) and Whitaker (JR). **Purification and partial characterisation of four trypsin/chymotrypsin inhibitors from red kidney beans (*Phaseolus vulgaris* var. Linden).** *Journal of Agricultural and Food Chemistry* 38(7): 1990: 1523-1529

Peas

1062
Aremu (CY). **Proximate and amino acid composition of cowpeas (*Vigna ungiculata* Walp) protein concentrate prepared by isoelectric precipitation.** *Food Chemistry* 37(1): 1990: 61-68

A cowpea protein conc. (CPC) was extracted from decoated seeds by the method of isoelectric point precipitation using dilute HCl acid. Proximate analysis revealed that the CPC had a protein content (N x 6.25) as high as 82%. Amino acid analysis indicated that the profile of amino acid in CPC was similar to that found in raw material. The potential use of CPC to supplement food that are low in protein is disscussed. AS

OILSEEDS AND NUTS

1063
Sundar Rao (K) and Singh (K). **Chemical composition of newer oilseeds.** *Journal of the Oil Technologists Association of India* 22(3): 1990: 56-57

The protein, oil contents and nature of fatty acids present in oilseeds of *Myoporum apiculatum*, *M. montanum* and *M. tetrandrum* of *Myoporacae*, *Patersonia lenata* of Iridaceae, *Stenophyllus longifolius* of Cyperaceae, *Scholtzia oligandra* and *S. laxiflora* of myrtaceae, *Styphelia* Sp. affin., pulchella of Epacridaceae, *Tetragonia decumbens* of Tertragoniaceae, *Trachyneneaniseocarpa* of Umbelliferae and *Xanthorrhoea australis* and *X. quadrangulata* of Xanthaorrhoeaceae have been reported. Results show that the oil and protein content in these oilseeds were not high compared to the conventional oilseeds. The unsaponifiable matter was slightly higher. The response to the Halphen, turbidity and picric acid test on the oils and methyl esters were negative. The oil contents were appreciably only in the seeds of *X. australis* (24.6%) and *X. quadrangulata* (24.1%). The IR and UV spectra of oils showed no unusual fatty acids. SRA

Cottonseeds

Cottonseed proteins

1064
Marshall (HFJr). **Isolation and purification of cottonseed 7S storage protein in its subunits.** *Journal of Agricultural and Food Chemistry* 38(7): 1990: 1454-1457

A rapid, simple method was developed for isolating and purifying the 7S storage globulin of cottonseed and its two major subunits. By use of small amounts of starting material, extractions were performed at 4 C except when otherwise necessary, preparation times are kept to a min., and, most importantly, purification of storage protein and its subunits is accomplished with high-performance liquid chromatography. A reverse-phase chromatography method was used to isolate and purify the subunits in one step. The 7S globulin was determined to have a mol. wt. of 98K and has two subunits of 54K and 48K. There was no covalent linkage between the subunits. Results indicate that the 7S storage protein has a simpler subunit comp. than previously reported. AS

Rapeseeds

1065
Tzeng (Y-M), Diosady (LL), Chen (B-K) and Rubin (LJ). **Ultrafiltration rejection coefficients of canola meal components.** *Canadian Institute of Food Science and Technology Journal* 23(2/3): 1990: 131-136

The effect of membrane processes on a compound in solutions can be best described by its rejection coeff. To predict the results of membrane processing aqueous canola meal extracts, averaged ultrfilteration rejection coeff. were determined for the groups of compounds that formed the major components of the meal. Average ultrafilteration rejection coeff., calculated from the results of batch ultrafilteration exp., are presented from glucosinolates, phytates, protein and non-protein N.

Glucosinolates had rejection coeff. close to 0 while the averaged ultrafilteration rejection coeff. of protein N was close to unity. Thus, ultrafilteration can be effective in removing glucosinolate from rapeseed meal with minimal loss of protein. Phytic acid and its salts had an average ultrafiltration rejection coeff. greater than 0.9 due the formation of complexes with the proteins and metal ions present in the system, which prevented their permeation through the ultrafilteration membrane used. This could be reduced to 0.65 by the addition of calcium chloride. AS

Rapeseed flour

1066

Schwenke (KD), Kroll (J), Lange (R), Kujawa (M), Schnaak (W), Steinert (A). **Preparation of detoxified high functional rapeseed flour.** *Journal of the Science of Food and Agriculture* 51(3): 1990: 391-405

Functional rapeseed flours were prepared by a mild soaking process using citric acid or ammoinum carbamate. This treatment was effective in lowering the content of sinapin, glucosinolate and their hydrolysis products. A post-treatment with alcohol/ammonia/water removed vinyloxazolidinethione, nitriles and isothiocyanates totally and left traces only of the glucosinolates. The treated flours possed increased water and oil absorption and excellent foaming properties. The soaking process also resulted in decrease of cooking loss in model meat systems of the frankfurter type. The treatment did not change the amino acid comp. which gave an essential amino acid index of 86 - 89. AS

Rapeseed proteins

1067

Deng (QY), Barefoot (RR), Diosady (LL), Rubin (LJ) and Tzeng (Y-M). **Lysinoalanine concentrations in rapeseed protein meals and isolates.** *Canadian Institute of Food Science and Technology Journal* 23(2/3): 1990: 140-142

Alkaline treatment of proteinaceous materials produces potential toxic lysinoalanine. Accordingly process involving alkaline extraction of protein to produce isolates could result in increased levels of lysinoalanine in these products. The lysinoalanine content of two canola protein isolate fraction prepared by aqueous alkaline extraction of canola meal precipitation of one protein fraction at the isoelectric pH and purification of the filterate by membrane processing followed by drying were determined to ensure that the process does not produce excessive quantities of lysinoalanine. Protein isolates which were prepared under mildly alkaline conditions typical of the process contained less than 500 µg/g lysinoalanine, concn. similar to that found in commerically produced casein and soybean protein isolates. The lysinoalanine contents of meals treated with NaOH increased with increasing concn. treatment temp. and contact time. Canola and soybean meals exposed to 0.1N NaOH for 2 h at 75 C contained 14,400 and 13,500 µg/g lysinoalanine, while similarly treated casein contained more than 19,500 µg/g lysinoalanine. The lysinoalanine content of canola protein isolates from canola meal produced by the methanol/ammonia-hexane process will not affect the use of these products as food ingredients. AS

Soybeans

1068

Sessa (DJ), Haney (JK) and Nelsen (TC). **Inactivation of soybean trypsin inhibitors with ascorbic acid plus copper.** *Journal of Agricultural and Food Chemistry* 38(7): 1990: 1469-1474

Soy products

Badi

1069

Patil (RT) and Nawab Ali. **A low-cost technology for making soybean "Badi" at rural/cottage level.** *Indian Journal of Nutrition and Dietetics* 26(8): 1989: 233-238

A low-cost technology has been developed to utilise the soybean as "Badi" (sun-dried legume spice mixture). The process for cottage level rural/urban soy-based food industry consists of cleaning and dehulling of soybean, soaking and wet grinding of soaked dhal, addition of salt/spices and cooking, drying and packaging. Soybadi has about 43% protein and 19% oil with neglegible anti-nutritional factor which will be destroyed further during curry/vegetable preparation. Cooking time needed is 30 - 40 min. Cost of production of badi is about Rs. 3/kg and soybadi is Rs. 7/kg. GSR

Soy flour

1070

Seth (KK) and Nirankarnath. **Storage stability of lipoxygenase-free full-fat soy flour packed in polyethylenes.** *International Journal of Food Science and Technology* 24(5): 1989: 559-565

Soy meal

1071

Stauffer (CE). **Measuring trypsin inhibitor in soy meal.Suggested improvements in the standard method.** *Cereal Chemistry* 67(3): 1990: 296-302

The parameters involved in the Trypsin Inhibitor Assay (AACC) method 71-10) were examined. The peak absorbance of the difference spectrum is at 385 nm rather than 410 nm as presently used: absorbance is 40% greater at the lower wave length. The formation of product during the incubation of N-benzoyl-DL-arginine p-nitroanilide was not linear with time. The effect this has on the numbers derived from the analysis was explored, and it is shown that the inhibitor concn. in a soy extract is under estimated by about 5%. A better method of treating the data derived from the assay is given, namely making a direct linear fit to the absorbance found in the presence of varying amounts of inhibitor. Michaelis-Menten parameter for the reaction of procine trypsin with substrate at 25 C, pH 8.2, 10mM calcium chloride are determined. For the reaction with the L-isomer (substrate) K_M = 2.20 mM and k_{cat} =8.92 second $^{-1}$. The D-isomer is a competitive inhibitor with K_I = 2.33 mM. Methods for expressing the amount of trypsin used per assay tube in SI units performing a titration assay on stock trypsin and by a rate assay using N-benzoyl-L-arginine ethyl ester are presented. Certain modification in the present standard method of trypsin inhibitor assay are suggested that allow detn. of inhibitor concn. in soy samples in SI units (moles per gram) rather than the present arbitrary TI units. AS

Sunflower seeds

1072

Theertha Prasad (D). **Proteins of the phenolic extracted sunflower meal. 1.Simple method for removal of polyphenolic components and characteristics of salt soluble proteins.** *Lebensmittel-Wissenschaft und - Technologie* 23(3): 1990: 229-235

Acidic aqueous acetone followed by aqueous acetone more efficiently removed polyphenolic components from sunflower defatted meal than acetone or acidic butanol systems. The amount of salt soluble proteins decreased in acidic aqueous acetone phenolic extracted meal. Salt soluble proteins were resolved by gel permeation chromatography into two to four major peaks and the low mole. wt. proteins (less than or equal to 5000 daltons) were found to be associated with phenolic compounds. The reduction in the extraction, variation in the electrophoretic and gel-permeation patterns of salt soluble proteins indicate that extraction for phenolic components at acidic pH, modifies the sunflower storage proteins. *In vitro* protein digestibility studies using pepsin and pancreatin demonstrate that acidic aqueous acetone-and aqueous acetone-phenolic extracted meals show higher protein digestibility than defatted (and acidic butanol) phenolic extracted meal. AS

1073

Theertha Prasad (D). **Proteins of the phenolic extracted sunflower meal. 2.Solubility fractionation and characterization of major protein fractions.** *Lebensmittel-Wissenschaft und - Technologie* 23(3): 1990: 236-241

Solubility fractionation of sunflower defatted and phenolic extracted meals indicates that globulins and glutelins are the major seed storage proteins. The globulins and glutelins prepared from acidic aqueous acetone and acidic butanol phenolic extracted meals differ from defatted and aqueous acetone phenolic extracted meals to a certain extent in their mobility on SDS-PAGE and their molecular sieve chromatography pattern. The present study demonstrates that the extraction of phenolic compounds at acidic pH selectivity denatures sunflower globulins, and this may be due to unfolding and high protonation of proteins. However, aqueous acetone can be conveniently used to prepare sunflower meal, having low phenolic content without causing much alteration in the conformation of sunflower storage proteins. AS

1074

Hettiarachdry (NS), D'Appolonia (BL), Jacobsen (A) and Henderson (J). **Shelf-life stability of hydrocolloid-coated confectionery sunflower nut meats.** *Cereal Foods World* 34(8): 1989: 618-619

Confectionery-type sunflower nut meats are used in salads, cookies, candies, confections, breads, trail and snack mixes, granola products and muffins and as an ice cream topping. Studies show that shelf-life stability of nut meats, can be extended by combination of coating and packaging. Alginate-Ca lactate coating process affords antioxidant and antirancidity protection for roasted sunflower nut meats and that Alure bags (a polyester-polyethylene laminate) afford better antioxidative protection than polyethylene bags. BV

TUBERS AND VEGETABLES

Onions

1075

Kallio (H) and Salorinne (L). **Comparison of onion volatiles by headspace gas chromatography-mass spectrometry.** *Journal of Agricultural and Food Chemistry* 38(7): 1990: 1560-1564

Beetroots

1076

Potter (RL), Bacheller (JD), Chassy (LM) and Mansell (RL). **Isolation of proteins from commercial beet sugar preparations.** *Journal of Agricultural and Food Chemistry* 38(7): 1990: 1498-1502

Using a combination of ultrafiltration/dialysis and ion-exchange chromatography, representative proteins from a variety of commerically available beet sugar preparations have been isolated. Analysis by SDS-polyacrylamide gel electrophoresis gave Coomassie blue or silver staining bands ranging from 10 - 68 kDa with a prominent doublet at about 35 kDa. Treatment of the samples with protease resulted in the loss of all bands and a concomitant accumulation of staining at the dye front. More highly purified or refined sugar samples also contained similar proteins but in lesser amounts. Protein yields, as determined by the Coomassie blue dye binding method of Bradford, ranged from 1228 ng/g of sugar for some crystal samples to 40 ng/g of sugar for a highly refined liquor grade sample. Inverted sugar samples also contained many of the same proteins found in the crystalline samples. AS

1077

Senge (B), Manzke (E) and Schmidt (P-V). **Air diffusion and influence of the boundary effect in ventilation of sugar beetroots.** *Lebensmittelindustrie* 37(1): 1990: 32-37

Sugar beetroots can be stored with low losses in stacks by ventilation with atmospheric air under observation of individual boundary conditions. The authors examined the outlet of the air by the length of the ventilation channel into the bulk, the distribution within the bulk as well as the influence of the boundary discharge to be stated in connection with the flowing of the bulk. The influence of the boundary discharge on the total pressure loss is discussed. AS

Cabbages

1078

Murai (K) and Wilkins (D). **Natural red colour derived from red cabbage.** *Food Technology* 44(6): 1990: 131

Potatoes

1079

Carlim (JT), Ho (C-T), Chang (SS), Velluz (A) and Pickenhagen (W). **Analysis of French fried potato flavour.Identification of 3-(methylthio) alkanals.** *Lebensmittel-Wissenschaft und - Technologie* 23(3): 1990: 276

Two new organoleptically interesting S compounds 3-(methylthio)butanal and 3-(mehtylthio)heptanal have been identified in an extract of French fried potatoes. BV

1080

Bhushan (B) and Thomas (P). **Effects of γ-irradiation and storage temperature on lipoxygenase activity and carotenoid disappearance in potato tubers (*Solanum tuberosum*).** *Journal of Agricultural and Food Chemistry* 38(7): 1990: 1586-1590

With the aim of exploring the causes for the enhanced destruction of carotenoids in irradiated potato tubers during storage at 15 C, changes in carotenoids and lipoxygenase activity of irradiated and nonirradiated tubers (cv. kufri chandramukhi) were compared during 6 months of storage at 4, 15, 20, and 25 - 30 C (ambient temp.). Carotenoid content tended to decrease in potatoes stored at 15 and 20 C, while at 4 and 25 - 30 C it increased with advancing storage. Irradiation enhanced the carotenoid disappearance in potatoes stored at 15 and 20 C and reduced its formation at 4 and 25 - 30 C. Irradiation at a sprout-inhibition dose of 100 Gy caused an immediate decline in lipoxygenase activity and also its capacity for cooxidation of β-carotene. The reduced lipoxygenase activity of irradiated potatoes was seen throughout storage regardless of the storage temp. Irradiated tubers showed decreased protein content and increased levels of peptides and amino acids. No interrelationship seems to exist between lipoxygenase activity and destruction of carotenoids in irradiated potato tubers. AS

1081

Giannuzzi (L) and Zaritzky (N). **Effect of sulphur dioxide on microbial growth in refrigerated pre-peeled potatoes packed in plastic films.** *Journal of the Science of Food and Agriculture* 51(3): 1990: 369-379

Microbial growth in pre-peeled potatoes was analysed to determine the simultaneous effect of sodium bisulphite concn (105 - 219 mg kg^{-1}), storage temp. (4, 7 and 10 C) and gaseous permeability of the packaging plastic film (polyethylene EVA-SARN-EVA used in vacuum) on product storage life. Composition of the microbial flora was determined at the begining and the end of the storage period, and the principle microorganisms causing spoilage of the product was observed *Pseudomonas* spp. and *Enterobacteriaceae*. Lag phase duration and specific rate constant were determined for these microorganisms in samples stored at each condition. In polyethylene-packaged samples microbial growth was observed at various temp. and sulphur dioxide concn. were tested with vacuum packaging in low oxygen permeability films and residues of 100 ng sulphur dioxide kg^{-1}, microbial counts were maintained in the lag phase; larger residues produced microbial inhibition at 4, 7 and 10 C. AS

Potato chips

1082

Mottur (GP). **A scientific look at potato chips-the original savoury snack.** *Cereal Foods World* 34(8): 1990; 620-626

Potato starch

1083

Lamberg (I) and Olsson (H). **Starch gelatinization temperatures within potato during blanching.** *International Journal of Food Science and Technology* 25(5): 1989; 487-494

The progression of gelatinisation within potato cylinders blanched at 65, 75 and 85 C for 2, 4 and 6 min. was followed by iodine staining of sections. The distance to the gelatinisation front was measured on photographs of both blanched and stained potatoes. A time-temp. simulation was performed with finite difference computer programme using thermal conductivity, sp. heat, phase transistion, density, heat-transfer coeff. and initial temp. as input data. Measured distances were used to determine the simulated temp. at the gelatinisation front. The computer-simulated temp. used to determine the gelatinisation temp. within blanched potato were in good agreement with published values. AS

Vegetables

1084

Osman (H). **Dietary fiber composition of common vegetables and fruits in Malaysia.** *Food Chemistry* 37(1): 1990; 21-26

Dietary fiber analysis were carried out using Southgate's method (Southgate 1978) on 15 types of leafy vegetables and five types of each of fruit-vegetables, leguminous vegetables and fruits. The non-cellulosic fractions were always higher than the cellulosic and lignin fraction. Total dietary fiber contents were highest in leguminous vegetables (3.3 - 6.8 g/100g) followed by the leafy vegetables (1.2 - 4.8 g/100g) and finally, the fruit-vegetables (1.4 - 4.2 g/100g). The fiber contents of fruit samples were relatively low (1.5 - 2.9 g/100g). In comparison with crude fiber values, the dietary fiber values were always higher. AS

1085

Gunther (K) and von Vohlen (A). **Simultaneous multielement determination in vegetable foodstuffs and their respective cell fractions by total-reflection X-ray fluorescence (TXRF).** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 190(4): 1990; 331-335

Total-reflection x-ray fluorescence (TXRF) was employed in the multielement detn. made on samples of lamb's lettuce and cauliflower as well as in the analysis of their soluble and insoluble cell fractions. All samples were digested with HNO_3 and the elements were quantitatively determined with Ga as internal standard. For cell fractionation, the freeze-dried vegetables were mortared in the presence of fine-grain quartz and extracted with a buffer solution; the resulting suspension was then separated by ultracentrifugation into cytosol and pellet components. K, Ca, Mn, Fe, Cu, Zn, Rb and Sr were the elements of which the total content and distribution between cytosol and pellet were determined. As a result of the cellular digestion and extraction procedures employed, greater than or equal to 50% of the total metal contents of Zn, Cu, K and Rb could be reduced to the cytosol phase in both vegetables, however, Sr, Fe, Ca and Mn were mainly bound to the insoluble pellet components which, in the case of cauliflower, contained up to 100% of the total Sr content. As a multielement method, TXRF proved to an excellent analytical tool in these investigations, since it requires only minute samples with simple preparation and involves a large dynamic measuring scale. AS

Leafy vegetables

1086

Mathur (B), Joshi (RN) and Bray (WJ). **Impact of supplementing leaf protein concentrate on**

haemoglobin levels of childern. *Indian Journal of Nutrition and Dietetics* 26(9): 1989: 267-271

Lucerne leaf protein conc. prepared by heat coagulation was supplemented at 9 % level to the that of children aged 4 - 9 yr receiving the 100g of snack food over a period of 9 months, so as to have 12% protein in their diet. The leaf protein conc. containing snacks raised the haemoglobin level from an initial average of 10.6 - 12.58 g/dl. GSR

1087

Fokou (E) and Dommgang (F). ***In vivo* assessment of the nutritive value of proteins "in situ" in the leaves of *Solanum nigrum* L., *Xanthosoma* sp., *Gnetul africanum* L.** *Indian Journal of Nutrition and Dietetics* 26(12): 1989: 366-373

Green leafy vegetables of (*Solanum nigrum* (Sni) *Xanthosoma* Sp.(Xan) and *Gentum africanum* (Gaf)) were evaulated for proteins for rat feeding exp. True digestibility (TD), biological value (BV), protein efficiency ratio (PER), net protein ratio (NPR), net protein utilization (NPU) were calculated after determining N in food, during faeces. Compared with casein the vegetables had TD of 72 - 76%, BV of 83 - 87% and NPU of 63 - 64%. The PER was 97% for Sni, 83% for Xan and 9.9% for Gaf. Proteins of these vegetables had high potency in promoting growth although rats feeding showed a decrease in body wt. perhaps due to toxic compounds. GSR

Quinoa

1088

Coulter (L) and Lorenz (K). **Quinoa - composition, nutritional value and food applications.** *Lebensmittel-Wissenschaft und - Technologie* 23(3): 1990: 203-207

The authors review the classification and grain (*Chenopodium quinoa, Ch. nuttalliae, Ch. pallidicaule* and *Ch. album*) morphology, comp. of the quinoa seed, starch characteristics, protein quality, processing and food uses. 27 references. BV

1089

Lorenz (K) and Nyanzi (F). **Enzyme activities in quinoa (*Chenopodium quinoa*).** *International Journal of Food Science and Technology* 24(5): 1989: 543-551

The amylase, protease, cellulase and hemicellulase activities were determined in the flour of untreated quinoa seed, and again after mechanical abrasion and after water and heat treatment to remove saponins. Optimum pH amylase activity was approx. 5.0 and protease activity it was 4.2. In comparison with a non-malted wheat flour, which generally would have a Brabender unit (BU) reading of over 2000 in the amylograph, values for quinoa were very low, indicating a high α-amylase activity mechanical abrasion which removed about 18% of kernel wt., increased α-amylase and protease activity of the seeds because of removal of layers low in activity. Only toasting of seeds of 170 C after saponin removal reduced activities of these enzymes substantially. Total amylase cellulase and hemicellulase activities were highest in the unprocessed seeds. Activities decreased after mechanical abrasion of seeds. Heat treatment after saponin removal caused a further decrease in activity of these enzymes. AS

Tomatoes

1090

Bertola (N), Chaves (A) and Zaritzky (NE). **Diffusion of carbon dioxide in tomato fruits during cold storage in modified atmosphere.** *International Journal of Food Science and Technology* 25(3): 1990: 318-327

The objectives of this work were to analyse the diffusion of carbon dioxide in tomatoes by measuring the concn. profiles in the internal atm. during non-study state exp., to determine the related resistance of the skin and stem scar of the fruit to mass transfer, to establish the existance of equilibrium relationships between the comp. of the internal gaseous atm. and carbon dioxide dissolved in the tissue, and to model mathematically the experimental results through the transient solutions of the mass transfer differential equation, expressing the effective diffusivity in terms of equations valid for hetrogenous system. It is indicated that the use of the non-study state method has shown that the flesh of the tomato offers resistance to gaseous diffusion, and the effective diffusivity of carbon dioxide in the flesh, the specific resistance of peel, and the contribution of stem and scar to gas exchange in tomatoes have been measufed, and the specific resistance of peel was 200 times greater than that of stem scar. SRA

1091

Kunzek (H). **Tests about the water binding behaviour of tomato powders.** *Lebensmittelindustrie* 37(1): 1990: 38-40

FRUITS

1092

Shewfelt (RL). **Quality of fruits and vegetables.** *Food Technology* 44(6): 1990: 99-106

The consumption pattern of fruits and vegetables, chem. comp., perception of quality (appearance, colour and texture), shelf-life, nutritional values, food safety, alternatives to chem. control of pests and challenges and opportunities are discussed in this article. BV

1093

Moore (C). **Formulation and processing of fruit snacks.** *Cereal Foods World* 34(8): 1989: 606-617

This article presents a familarization and working knowledge experience for those interested in manufactured fruit food products. Aspects covered are fruit fillings, fruit pie fillings, intermediate moisture fruit fillings, high solid fruit fillings, dried and candied fruits, comp. of fruit snacks, and fruit inclusion for bakery and dry mixes. BV

1094

Tsami (E), Maroulis (ZB), Marinos-Kouris (D) and Saravacos (GD). **Heat sorption of water in dried fruits.** *International Journal of Food Science and Technology* 25(3): 1990: 350-359

The heats of adsorption and desorption of water in dried fruits utilizing equilibrium data and to relate the heat of sorption to the moisture content is investigated. Samples of commercial Greek dried fruits (Raisins, figs, prunes and apricots) containing 15% moisture were used for the detn. of moisture-sorption isotherms from 15 - 60 C. The net isostearic heat of sorption (qst) decreased sharply from 20 kjmol $^{-1}$ water to near 0 when the moisture content was increased from 0.05 - 0.50 kg water kg $^{-1}$ dry matter. An exponential function was fitted to the experimental qst values at various moisture content (x) yielding 2 characteristic constants (q_0 and x_0) for each fruit. Mean and total heats of sorption were calculated from proposed empirical equation useful for enthalpy prediction in food dehydration. The heats of desorption were higher than the heats of adsorption, indicating significant hysteresis in the sorption of water, especially in dried apricots. SRA

1095

Sharma (GK), Madhura (CV) and Arya (SS). **Interaction of plastic films with foods. I.Effect of polypropylene and polyethylene films on fruit squash quality.** *Journal of Food Science and Technology (India)* 27(3): 1990: 127-132

Effect of polyethylene (PE) and polypropylene (PP) film contact on the quality of fruit squash (orange and lemon) and beverages (mango, orange and blue grape) was studied by storing them in glass bottles at room temp. (18 - 35 C) both with and without pieces of plastic films immersed in them. Both PE and PP significantly increased the rate of non-enzymic browning and depletion of d-liomene and anthocyanin concn. PE and PP contact did not significantly influence ascorbic acid (AA) degradation in squashes/beverages but in isolated system AA degradation increased in the presence of films. The changes in total carotenoids, sulphur doxide and titratable acidity were not affected by films. PE and PP contact did not cause perceptible changes in sensory quality of squashes/beverages. AS

1096

Mastrocola (D), Severini (C) and Lerici (CR). **Enzymatic browning of fruits.Colorimetric evaluation.** *Industrie Alimentari* 28(276): 1989: 1064-1067, 1070 (It)

Reflectance measures were used to control the extent of enzymatic browning on cut surfaces and in the puree of different fruits. Variations of reflectance L^*, a^* and b^* values were correlated with the extent of browning in vegetal tissues. The measures of L^* values in apple puree have shown that browning decreased with the decreasing of temp., pH and water activity. AS

Apples

1097

Bhardwaj (JC) and Lal Kaushal (BB). **A study on drying behaviour of rings from different apple cultivars of Himachal Pradesh.** *Journal of Food Science and Technology (India)* 27(3): 1990: 144-149

Three pollinizing var. of apple viz., 'Red Gold', 'Golden Delicious' and 'Granny Smith' were pretreated with sulphur dioxide as anti-browning agent before sun-drying and dehydration as apple rings. Sun-drying retained moisture content between 14.5 - 16.1%, titrable acidity between 1.17 - 2.70% (DWB), reducing sugar between 48.2 to 53.9% (DWB), total sugar between 65.5 - 69.9% (DWB) and ascorbic between 2.5 - 7.5 mg/100g, whereas on dehydration they ranged between 14.2 - 16.8%, 1.23 - 2.73%, 47.7 - 54.8%, 67.9 - 75.3% and 2.5 - 12.5 mg/100g resp. Total sulphur dioxide retention varied between 96 - 288 p.p.m during dehydration which was lower in sun-dried rings (48 - 224 p.p.m). There was a proportionate decrease in sulphur dioxide content during storage in all the lots greately influencing the nutritional value of the product. Higher sulphur dioxide content resulted in better ascorbic acid retention and overall quality of the product during 180 days storage. Optical density (OD at 440 nm) taken as index of browning increased with decreased in sulphur dioxide

content. On the basis of yield, appearance and taste, dehydrated product and 'Golden Delicious' among cv have given better dried products. Among different treatments 2500 p.p.m sulphur dioxide dip of apple rings resulted in best dried products on sun drying and dehydration as well as after 180 days storage. AS

1098

Janovitz-Klapp (AH), Richard (FC), Goupy (PM) and Nicolas (JJ). **Kinetic studies on apple polyphenol oxidase.** *Journal of Agricultural and Food Chemistry* 38(7): 1990: 1437-1441

1099

Prabha (TN), Salimath (PV) and Patwardhan (MV). **Primary metabolites and organic acid metabolism in apples (*Malus sylvestris*) fruit callus culture.** *Journal of the Science of Food and Agriculture* 51(3): 1990: 381-389

In vitro culture cells were obtained from 7 different var. of Indian apples *Malus sylvestris* L) the cultivar Golden Delicious showed the highest yield of callus tissue followed by Maharaji and American Epirouge. Cultured apple cells exhibited some deviations from the apples fruit in primary metabolism as well as primary metabolites profiles. In callus cultures, the pool size of free amino acids and organic acids increased considerably while free sugar pool decreased drastically compared with apple fruit. There was higher incorporation of ^{14}C acetate, ^{14}C citrate, ^{14}C malate and ^{14}C succinate into the carbon dioxide, lipid, protein, carbohydrate and amino acid fractions and lower incorporation into the free sugar fractions in cultured cells compared with the explant. The incorporation of ^{14} carbon dioxide showed a similar trend. Qualitatively, there was some similarity between the callus and explant in free amino acid and sugar profiles and dissimilarity in organic acids. Compounds such as citrate, succinate and fumerate and also some amino acids (methionine, arginine, leucine and proline) were present at higher concn. in callus culture whereas they were almost absent in the original tissue. There were also differences in the carbohydrate and protein profiles of explant and callus as judged by their sugar and amino acid make-up resp. AS

Bananas

1100

Wainwright (H) and Hughes (PA). **Objective measurement of banana pulp colour.** *International Journal of Food Science and Technology* 24(5): 1989: 553-558

Two methods for determining the colour of banana pulp were compared by using either visual matching with colour chart or a portable tristimulus calorimeter. Pulp colour of ripe and unripe banana was evaluated in both the darker central carpellary zone and the outer pulp zone near the skin of the fruit. The colour coordinates L^* and b^* were highly correlated (r = -0.89 and 0.87 resp.) with visual matching colour charts, the central carpellary region giving higher correlations than the outer pulp zone. Results obtained show that the colour of banana pulp can be objectively measured by the combined use of L^* and b^* coordinates determined in the carpellary zone. The potential use of a reproducible and defined method for determining the banana pulp colour is discussed. AS

Grapes

1101

Barron (LJR) and Santa-Maria (G). **A relationship between triglyceride and grape-ripening indices.** *Food Chemistry* 37(1): 1990: 37-45

Two varieties of *Vitis vinifera*, cv Airen and Cencibel, were studied during the latter stages of ripening, and factor analysis were applied to the lipids and traditional ripening indices. The results suggest differences in the metabolic usage of triglycerides depending on the molecular species. As might be expected, triglycerides were used as energy sources, but the metabolic availability of certain molecular species was more directly related to the ripening process. AS

Mangoes

1102

Wilson (CWIII), Shaw (PE) and Knight (RJJr). **Importance of some lactones and 2,5-dimethyl-4-hydroxy-3-(2H)-furanone to mango (*Mangifera indica* L.) aroma.** *Journal of Agricultural and Food Chemistry* 38(7): 1990: 1556-1559

Sensory panels were used to assess the contributions to mango aroma by a mixture of seven lactones in amounts present in Alphonso and Baladi mangoes, two lactones in amounts present in Keitt mango, and 2,5-dimethyl-4-hydroxy-3(2H)-furanone by using a bland puree from Tommy Atkins mango. The mixture of lactones added to Tommy Atkins puree in concn. reported for Alphonso mango was significantly preferred to Tommy Atkins puree alone and to a mixture of lactones added to puree at the higher concn. reported for Baladi mangoes. Aroma panelists significantly preferred the lactone mixture added to Tommy Atkins puree in concn. reported for

Alphonso mangoes over Tommy Atkins, Haden, and Kent mango purees. 2,5-Dimethyl-4-hydroxy-=3(2H)-furanone did not make a positve contribution to mango aroma or flavour, and some panelists suggested its presence caused an overripe aroma and flavour. AS

Pineapples

1103

Shafiur Rahman (M) and Lamb (J). **Osmotic dehydration of pineapple.** *Journal of Food Science and Technology (India)* 27(3): 1990: 150-152

Water loss from pineapple increased with the increase of sucrose solution temp. and concn., the former having much more effect for the range of values tested. The sugar gain increased up to 50 C and then fell rapidly; it also increased with increase in solution concn. The solute diffusion of pineapple was analysed by Magee's model. AS

CONFECTIONERY, STARCH AND SUGAR

1104

Ofoli (RY), Komol Prasert (V), Saha (VC) and Berglund (KA). **Production of maltose by reactive extrusion of carbohydrates.** *Lebensmittel-Wissenschaft und - Technologie* 23(3): 1990: 262-266

It has been demonstrated that combined liquefaction and saccharification of a food formulation using thermophilic α-and β-amylase enzymes during a single extrusion pass is possible. A careful mixture of screw configuration, mass flow rates and RPM enabled average residence times of approx. 10 min. to be achieved in the extruder. While the conversion obtained in this study were low in comparison to batch processes; the procedure provides opportunities for enchancing specific product characteristics. Further studies should be designed to provide a fundamental understanding of the reactions and mechanisms associated with reactive extrusion. AS

Starch

1105

Sievert (D) and Pomeranz (Y). **Enzyme-resistant starch. II. Differential scanning calorimetry studies on heat-treated starches and enzyme-resistant starch residues.** *Cereal Chemistry* 67(3): 1990: 217-221

Enzymatic assay of heat-treated starches from amylomaize VII, regular maize, wheat, peas, and potatoes indicated that enzyme-resistant starch (RS) was present in all treated starches. The RS residues exhibited and endothermic transistion at - 155 C in the differential scanning calorimetry (DSC) thermogram, which apparently was due to melting of recrystalised amylose. However, with the exception of amylomaize starch, amylose crystallites could not be detected directly in treated starches by the DSC technique. Only after degradable starch structure were removed and enzyme-reistant amylose crystallites were isolated and concentrated, could their dissociation be recorded. RS residues from amylomaize VII, regular maize and wheat starch showed an additional small endothermic transition between 41 and 67 C. Thermoanalytical characteristics of this transition were investigated using RS residues from amylomaize VII starch preparations A DSC run of vacuum-dried RS residues with and without added water led to formation of the peak at 54 C. After cooling the residues, an exothermic transition occurred i.e., the transformation was thermoreversible. Reheating and cooling of vacuum-dried RS in the calorimeter revealed that even temp. upto 180 C did not completely destroy the structures responsible for peak formation. The role of starch, proteins, lipids in generating the 54 C transition was investigated. The finding suggested that uncomplexed lipid components induced formation of this endotherm in some RS residues. Protein derived from amylolytic enzymes used in the enzymatic assay also seemed to play a role in generation of the endotherm. AS

BAKERY PRODUCTS

1106

Boyle (PJ) and Hebeda (RE). **Antistaling enzyme for baked goods.** *Food Technology* 44(6): 1990: 129

Bread

1107

Bajwa (U) and Bains (GS). **Supplementation of glycerolysed oils and α-amylases in breadmaking. III.Changes in water soluble components during ageing of bread.** *Journal of Food Science and Technology (India)* 27(3): 1990: 153-155

The effect of incorporation of glycerolysed groundnut oil/coconut seed oil and/or optimal α-amylases on reducing sugar content and water extractable components of bread during storage was investigated. α-amylases significantly increased the reducing sugar content of bread crumb. Total soluble solids alcohol insoluble solids, total hydrolysable carbohydrates and polysaccharides

other than starch significantly increased due to aging of bread for 72 h. Soluble starch decreased in the control bread. However, it increased when supplemented with glycerolysed oils. Amylase content increased on supplementation with amylases. However, it decreased on aging. AS

1108

Collar (C), Mascaros (A) and Benedito de Barber (C). **Biochemical evolution of nitrogen compounds during fermentation of wheat bread doughs containing pure cultures of lactic acid bacteria.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 190(4); 1990; 397-400

The metabolic activities of three species of lactic acid bacteria (*Lactobacillus brevis*, *L. plantarum* and *Streptococcus faecium*) during wheat bread dough fermentation have been investigated by evaluating the biochemical changes which occur in 0.85 mol/L NaCl-soluble N components in unfermented, 4-h and 24-h fermented straight doughs. Non-protein N compounds increase during a 24-h-fermentation period in all doughs. Exoproteolytic activity is denoted mainly in *L. plantarum* fermented doughs by an important rise in the free amino acids. Doughs containing *L. brevis* show a larger production of peptides over a 24-h fermentation period and strong nutritional requirements on low-molecular-weight peptides are evidenced by *Streptococcus faecium* over short fermentation periods. Progressive depletion in the polypeptides and protein contents as well as a decrease in the estimated protein chain length over the fermentation period for *L. plantarum* and *Str. faecium* containing doughs are evidence of endoproteolytic activities in high-mole. wt. soluble components. An increase in the size of the protein fragments released in the 4-h fermented doughs containing *L. brevis* denotes enzymatic hydrolysiss on non-soluble protein chains. AS

Cookies

1109

Artz (WE), Warren (CC), Mohring (AE) and Villota (R). **Incorporation of corn fiber into sugar snap cookies.** *Cereal Chemistry* 67(3); 1990; 303-305

Sugar snap cookies with added corn fiber (extruded and non-extruded) were compared with a control. Extruded corn fiber was substituted for flour (15%, w/w) in the first treatment, and non-extruded corn fiber (15%) was substituted for flour in the second. The third group, are control, contained no added fiber. The moisture content of the cookies differed significantly depending upon the fiber comp. (P 0.05). The cookies prepared without added fiber had the greatest moisture content followed by cookies with extruded fiber, and finally cookies with non-extruded fiber. Shear values for the cookies containing non-extruded fiber were significantly lower than for cookies formulated with extruded fiber or the control (P 0.05). The addition of either fiber type imparted a darker colour to the product. Sensory analysis indicated no significant difference between the non-extruded and extruded fiber cookies, but significant difference in sensory scores were found between cookies containing extruded fiber and controls (P 0.05). In each case the control cookies without added fiber were prefered. AS

1110

James (C), Courtney (DLD) and Lorenz (K). **Rice bran-soy blends as protein supplements in cookies.** *International Journal of Food Science and Technology* 24(5); 1989; 495-502

The effect of incorporating one of the 3 stabilised full-fat rice brans in combination with each of 4 soy ingredients in a sugar-snap cookies was investigated. The four soy ingredients in a sugar-snap cookies were 2 soy flours (full-fat and defatted), a soy conc. and a soy isolate. Rice bran and soy were added in place of wheat flour to increase protein content from 6% to a min. of 9%, and the cookies were compared with each other and with a 100% wheat flour cookie. Quality characteristics evaluated included protein, spread, physical texture and colour, and sensory preference by ranking for colour, crispness and flavour. In general, the rice bran-soy cookies had less spread (even with added shortening, water and emulsifier), were less crisp and more chewy, and were somewhat darker in colour than the 100% wheat flour cookie. The soy isolate, USDA and Protex 20-S cookies were as acceptable in colour, crispness and flavour as the control. AS

Dough

1111

Amend (T) and Belitz (H-D). **The formation of dough and gluten - a study by scanning electron microscopy.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 190(5); 1990; 401-409

Pasta

1112

D'Egidio (MG), Nariani (BM), Mardi (S), Mòvaro (P) and Cubadda (R). **Chemical and technological variables and their relationships.A predictive equation for pasta cooking quality.** *Cereal Chemistry* 67(3); 1990; 275-281

Fifty samples of Italian Durum wheats from 10 var. were evaluated for predicting their pasta cooking quality. Pasta was dried at 40 and 80 C and the cooking quality was measured as organoleptic judgement and total organic matter values. Factor analysis was applied to 26 variables as a clustering tool and 3 among them were useful in relating with other variables. The first related to the rheological characteristics which is defined as quality factor, the second is associated with protein and gluten content which called as the quality factor and the third was related to cooking quality of pasta dried at 40 C. Drying at 80 C and related quality change was linked to the quality factor. Predictive equations for pasta cooking quality were calculated with these variables and values required to give significant improvement in pasta cooking quality were found. AR

MILK AND DAIRY PRODUCTS

1113

Thompkinson (DK) and Mathur (BM). **Current status of biotechnological applications in dairy industry.** *Indian Dairyman* 43(1): 1991: 9-11

Briefly reviews genetic manipulation to produce enzymes like calf rennet, and also genetic application in the production of protein rich products from whey. 9 references. SRA

1114

Aneja (RP). **Research and development of priorities of the Indian dairy industry.** *Indian Dairyman* 43(1): 1991: 3-7

The author indicates that the future planning for dairy programmes should aim in increasing the productivity and improve the conversion efficiency from fuel to milk, and dairy being environmental friendly produces no harmful effects, and the breeding and feeding should aim at evolving better feed converters, ultimately aiming at producing better quality of milk and milk products. The author stresses for improving the quality of milk and milk products even at the processing point, and also concentrating on export of dairy products and there is scope for improving the quality of ghee, khoa, channa and traditional milk based sweets. SRA

1115

Dilley (CL) and Dixon-Holland (D). **Rapid residue test for aflatoxin M** [1] and sulphamethazine in dairy products. *Food Technology* 44(6): 1990: 132

1116

Murdia (LK) and Verma (RD). **Line heat source method for thermal conductivity of dairy products.** *Indian Journal of Dairy Science* 42(1): 1989: 42-46

The present study is carried out to determine the thermal conductivity of solid dairy products such as butter and paneer and liquid products such as liquid butter, ghee and milk of different concn. during manufacture of khoa using line heat source method, which is quick and can be used to determine thermal conductivity of the product at different temp. and conditions directly. This method has advantages over conventional study state method. The values observed for products were analysed to form equations to predict thermal conductivity of above product of various conditions. This information is useful in design the equipments for continuous manufacture of ghee, khoa, and paneer. SRA

1117

Rajasekaran (M) and Rajor (RB). **Manufacture of frozen yoghurt like product from soybean and skim milk/buttermilk solids.** *Indian Journal of Dairy Science* 42(1): 1989: 132-135

1118

Andersson (H), Andren (A) and Bjorck (L). **An enzyme-linked immunosorbent assay for detection of chymosin in dairy products.** *Journal of Dairy Science* 72(12): 1989: 3129-3133

Milk

1119

Bhatt (PK) and Upadhyay (KG). **Inventory of milk fat and/or milk solids losses in the manufacture of fat-rich dairy products.** *Indian Dairyman* 43(1): 1991: 13-23

Measures which have a bearing on the loss of fat in the manufacture of fat-rich dairy products have been outlined. These include the relevance of productivity in the dairy industry; extent of inventory of milk fat and milk solids losses in the manufacture of fat-rich dairy product and its impact on pollution; management of inventory of milk fat and milk solid losses; and indicative measures for an efficient dairy plant management to minimise losses of milk fat and milk solids in the manufacture of milk products including fat-rich dairy products. SRA

1120

Menon (KKG). **Role of milk in human diets/nutrition.** *Indian Dairyman* 43(2): 1991: 89-94

Some of the unique features of milk, fats, proteins and carbohydrates and their effect on human system have been highlighted. SRA

1121

Padmini Gupta. **Acceptability trials of milk and curds after boiling/storing in different types of utensils.** *Indian Journal of Nutrition and Dietetics* 26(6): 1989: 171-174

Milk was boiled, stored for 4 h, allowed the curd to set in and buttermilk was prepared and stored in iron, brass (tin coated), steel and earthen vessels and the acceptability of each was assessed. The results showed that the milk boiled and kept for 4 h in earthern pot was least acceptable; but milk kept for 4 h in steel vessel was highly acceptable. Curd set in different vessels as also the buttermilk prepared and kept in different vessels did not show any difference in acceptability. However, difference in the scores for various qualities like colour and appearance was prominent to affect the overall acceptability in all cases. GSR

1122

Tariz Nasud, Abdul Bari and Amin Shah (N). **Incedence of pathogenic staphylococci in milk and milk products.** *Indian Journal of Nutrition and Dietetics* 26(8): 1989: 239-242

Dairy products (244 samples) like khoa, burfi, pera, ice cream, butter and dahi(curds) were collected from twin shops of Islamabad and Rawalpindi in Pakistan. Of these, 137 samples were found contaminated with *Staphylococci* and among the later 85 samples yielded *Staphylococcus aureus*. Khoa had the max. (87%) of *S. aureus* followed by milk (46.67%), kulfi (40%), pera (33.33%), ice cream (28.13%), burfi (23.33%), butter (18.75%) and dahi (3.33%).. This study suggested that milk and milk products have the potential to cause the staphylococcal intoxication in consumers. GSR

1123

Halpin-Dohnalek (MI) and Marth (EH). **Fate of *Staphylococcus aureus* in an emulsion and a spread made of milk fat and vegetable fat.** *Lebensmittel-Wissenschaft und - Technologie* 23(3): 1990: 242-245

A cream-vegetable oil emulsion was made to contain 35% fat, with 60% of the fat contributed by vegetable oil and 40% by milk fat in cream. The emulsion was inoculated with c., 10^6 *Staphylococcus aureus*/ml and held at 10 - 37 C for upto 48 h. Following incubation the emulsion was churned to obtain a spread with c., 80% fat, which was held at 10 - 25 C for upto 21 days. *S. aureus* strains 100-A, 196-E, 254, 505, and 521 varied in their ability to grow and survive in the cream-vegetable oil emulsion in the spread. Viability was also related to incubation temp. The cream-vegetable oil emulsion and spread did not support the growth of most *S. aureus* strains. Less than a 100-fold increase in Staphylococcal count was noted. Commercially-made butter-vegetable fat spread was inoculated with c., 10^5 *S. aureus*/g and held at 4 C for 28 days and at 25 C for 14 days. Loss of viability was greater in inoculated commercially-made than in spread made in the lab. from inoculated cream-vegetable oil emulsion when both products were incubated at 25 C. AS

1124

Tai (SC-C), Cargile (N) and Barnes (CJ). **Determination of thiabendzole, 5-hydroxythiabendazole, fenbendazole, and oxfendazole in milk.** *Journal of the Association of Official Analytical Chemists* 73(3): 1990: 368-373

The liquid chromatographic detn. previously developed for benzimidazole in cattle liver has been slightly modified and applied to the detn. of 4 benzimidzoles in milk. Recoveries of fenbendazole (FBZ), oxfendazole (OFZ) and thiabendazole (TBZ) from milk fortified at the 10 p.p.b level were 80% or greater with an intralaboratory coeff. of variation of 11% or less. Recoveries of 5-hydroxythiabendazole (5-OH-TBZ) at the 30 p.p.b level average 56% with an intralaboratory coeff. of variation of 5%. Limited data on the definition of FBZ, OFZ, TBZ, and 5-OH-TBZ in milk were also generated. AS

1125

Meetschen (U) and Petz (M). **Capillary gas chromatographic method for determination of benzylpenicillin and other β-lactam antibiotics in milk.** *Journal of the Association of Official Analytical Chemists* 73(3): 1990: 373-379

A capillary gas chromatographic method is described for determining the residues of β-lactam antibiotic residues in milk with specificity for benzylpenicillin (penicillin G), phenoxymethylpenicillin, methicillin, oxacillin, cloxacillin, dicloxacillin, and nafcillin. Residues were extracted from milk with acetonitrile. Samples are cleaned up partitioning between aqueous and organic phases at differenct pH values. The penicillin residues are methylated with diazomethane to render them amenable to detn. by GC on methylsilicon fused silica column. Samples are introduced by split/splitless injection using a programmed temp. vapourisation injector and or detected by N-selective thermionic detection. Internal standardisation is used for quantitation. The limits of detection for all penicillins are well below 1 μg/kg. Recoveries of spiked samples at 3

and 10 µg/kg are in the range of 42 - 85% (coeff. of variation 2 - 5%) and 41 - 92% (coeff. of variation 3 - 7%) resp. AS

1126

Rama Raju (VV) and Kiran Kumar (M). **Heat resistance of aerobic spore forming bacteria in milk.** *Indian Journal of Dairy Science* 42(1): 1989; 71-74

Studies on the heat resistance on the spores of 7 sp. of mesophiles indicated that *B. polymyxa, V. megatherium, B. circulans* and *B. coagulans* were the least heat resistant being destroyed within 5 min. at 109 C whereas *B. subtilis* could resist 109 C for 5 min. and *B.cereus* and *B. licheniformis* could resist 115 C for 10 min. The spores of thermophilic organisms such as *B. stearothermophilus* were found to be the most heat resistant ones surviving heat treatment at 115 C for 15 min. even at the lowest concn. of 10^4 spores/tube. The temp. combination of 121 C for 10^4 min. was the max. required for complete destruction of this organism. AS

1127

Kiran Kumar (M) and Rama Raju (V). **Aerobic sporeforming bacteria in heat treated cow milk.** *Indian Journal of Dairy Science* 42(1): 1989; 75-81

Investigation was made in view to isolate and identify the aerobic psychrotrophic, mesophilic and thermophilic and sporeforming bacteria from heat treated cow milk samples at different temp.- time. Samples were heat treated at 109 C for 15 min., 115 C for 10 min. and 121 C for 5 min. Out of the 26 isolates of psychrotrophic sporeforming bacteria from heat treated cow milk samples, *B. cereus* (38%) was predominating followed by *B. pumilus* of 19% and *B. badius, B. polymyxa, B. licheniformis* and *B. firmus* composed less than 15% each. Among 54 isolates of mesophilic sporeforming bacteria *B. subtilis* accounted for 35% followed by *B. licheniformis* (19%) and less than 13% *B. cereus, B. pumilus*. Out of 55 isolates of thermophilic sporeforming bacteria *B. stearothermophilus* was 68%, *B. coagulans* and *B. licheniformis* 16% each. It is observed in this study that *B. cereus, B. subtilis* and *B. stearothermophilus* may be designed as indicator organisms among psychrotrophic and mesophilicand thermophilic sporeforming bacteria in heat treated cow milk samples. SRA

1128

Sur (A) and Joshi (VK). **Changes in flavour characteristics and volatile fatty acids contents of UHT milk during storage.** *Indian Journal of Dairy Science* 42(1): 1989; 125-126

UHT milks stored at 22 and 37 C were examined for changes in flavour and volatile acids at regular intervals for 1 month. The flavour of UHT milk declined with the advancement of the period of storage at 22 or 37 C. At 22 C an increase in the flavour score at initial stages and reacted max on 4th day of storage. Storage of UHT milk beyond 22 C for 19 days adversely affected it flavour. The volatile fatty acids showed gradual and steady increase throught with the increase of the storage period at both temp. (22 and 37 C). After 26 days of storage a sharp increase in the level of volatile fatty acids of the stored milk samples was observed. BV

1129

Sur (A) and Joshi (VK). **Changes in viscosity, pH, oxygen content, sedimentation characteristics and fat separation in UHT milk during storage.** *Indian Journal of Dairy Science* 42(1): 1989; 130-131

No significant change in viscosity and pH during storage was noticed. Viscosity and pH were found to be in the range of 1.97 - 2.44 cp. and 6.0 - 6.6 resp. No gelation in the samples could be noticed within 5 months of storage. A decrease in dissolved oxygen content from an initial value of 8.2 p.p.m during storage at 37 C was also noticed. During the first 7 days of storage the sediment volume was very less and it increased from 0.02 - 0.06ml/15 of the sample with the increase of the period of storage. Visible fat separation was formed in the stored samples at the top of milk and on the samples of the wall of each packet containing the sample only after 33 and 40 days at 37 and 22 C resp. BV

1130

Singh (RRB) and Patil (GR). **Storage stability of UHT buffalo milk. II.Sensory changes and their relationship with physico-chemical properties.** *Indian Journal of Dairy Science* 42(2): 1989; 384-387

1131

Garbati (M). **Some aspects of the milk quality development.** *Industrie Alimentari* 28(276): 1989; 1071-1074 (It)

Milk products

1132

Mahadevan (AP). **Nutritive value of traditional milk products of India.** *Indian Dairyman* 43(2): 1991; 95-101

Traditional milk products reviewed include dahi, buttermilk, butter and ghee; paneer and traditional milk based sweets and cheese like products. 9 references. SRA

1133

Punjrath (JS). **Indigenous milk products of India-the related research and technology requirements in process equipment.** *Indian Dairyman* 43(2): 1991; 75-87

The indigenous milk products of India have been classified into condensed cultured acid precipitated products. Technological innovations in khoa, shrikhand, and gulab jamun manufacture; innovation of process equipment for manufacture of ghee and other indigenous milk products have been reviewed with flow sheet and process and equipment design in detail. 7 references. SRA

1134

Mathur (BN). **Indigenous milk products of India.The related research and technological requirements.** *Indian Dairyman* 43(2): 1991; 61-74

Highlights the product characteristics and traditional process employed for the manufacture of commercially important indigenous milk products. They include heat dessicated products (khoa, rabri, kurchah), heat/acid coagulated products (paneer, channa), fermented products (dhai, shrikhand, lasi, matha), fat-rich products (ghee, makhan), frozen milk products (kulfi, malai-ka-barafi), milk sweets (khoa-based sweets, peda, burfi, kalakand, milk cake, gulab jamun), channa based sweets (rasagola, rasamali, panbooa, sandash, channa-murki), and cereal high-based sweets/desserts (kheer and pal-payasam). SRA

1135

Baxi (JJ). **Dairy products mix of India's modern dairy industry.** *Indian Dairyman* 43(2): 1991; 102-105

The factors contributing for shaping the Indian dairy industry's product mix and a profile of the current product mix of the scenario in the Indian market is given. There is also good market for the traditional Indian milk products and these have been tested. It is necessary that the good investment must be made in product development and this should also be combined with investment for good market development for the emerging products. SRA

1136

Kumarm (S) and Mathur (BN). **Studies on the manufacture of yoghurt and mozzarella cheese from milk preserved by LP-system.** *Indian Journal of Dairy Science* 42(1): 1989; 194-197

Starter cultures produced slower rate of acidity in milk preserved LP-system. Thus setting of curd was delayed by 1 h 30 min. in the case of yoghurt when LP-treated milk was used. In the case of yoghurt made from LP-treated milk, though flavour was quiet acceptable received lower ratings from the judges. The sensory characteristics with regard to body and texture of yoghurt were not affected as a consequence of LP-treatment. In the case of Mozzarella cheese manufacture from LP-treated milk, curd took about 2 h longer for stretching operation due to slower rate of acid development in comparison with control, probably due to the reactivation by LP-system. Consequent to longer time for manufacture, moisture retention was lower in the exp. cheese. However, on dry matter basis there were no compositional differences between the two types of cheese. Equally good quality of pizza could be prepared from the mozzarella cheese made from untreated as well as LP-treated milks. AS

1137

Chopra (R) and Gandhi (DN). **Effect of stabilizers on the control of whey separation in fermented beverages prepared from sweet cream buttermilk.** *Journal of Food Science and Technology (India)* 27(3): 1990: 182-183

In the preparation of fermented beverages using sweet cream buttermilk, wheying-off (syneresis) was observed on the surface of the product which was not appreciated on sensory evaluation. Stabilizers were used to mitigate the defect. Pectin, gelatin, carrageenan and sodium salt of carboxymethyl cellulose (CMC) at 0.05 or 0.1% were tried. Gelatin even with lower concn. was found most beneficial followed by CMC and pectin. Carrageenan did not seem to prevent whey separation. Addition of gelatin improved the consistency of the product and stabilized lactic acid gel in fermented beverages. AS

Cheese

1138

Singh (S) and Kanawjia (SK). **Quality assessment of market samples of processed cheese.** *Indian Journal of Dairy Science* 42(1): 1989: 53-59

4 main brands of processed cheese samples were procured from Indian market. Samples represented one popular foreign brand, two from commercial organisation and one from an institute. Flavour and colourwise, Indian samples compared favourably well with foreign brand but body and texture wise they were inferior. Indian brands were similar to foreign brand in comp. except moisture content. The moisture was more in Indian brands. There was marked difference in shelf-life, the max. being in case of foreign brand. Two commercial samples were poor. The biochemical changes during storage included pH, titratable acidity, soluble N and FFA. In Indian samples the biochemical changes tended

to be more. The bloating of process cheese samples after 6 months is also reported. SRA

1139

Satya Prasad (Y) and Mathur (MP). **Immobilization of some proteases for cheese manufacture.** *Indian Journal of Dairy Science* 42(2): 1989; 388-390

1140

Martin-Hernandez (C), Jaurez (M), Ramos (M) and Martin-Alvarez (P). **Effects of freezing and frozen storage on the physico-chemical and sensory characteristics of four types of goat's cheese.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 190(4); 1990; 325-330

Physicochemical and organoleptic properties were studied in two batches of four different types of goat's milk cheese: fresh, washed curd, soft with surface flora, and Majorero, frozen for four months prior to ripening and/or chilled storage. Frozen storage did not produce significant changes in the rheological or sensory characteristics of the cheeses, except in the case of fresh cheese, the textural characteristics of which were adversely affected. The level of proteolysis, estimated from the amino-acid N, was higher in the pre-frozen washed curd, soft with surface flora, and Majorero cheeses. The level of lipolysis was comparable, except in the soft cheese with surface flora, which presented higher levels of free fatty acids when stored frozen before ripening. AS

Cheddar cheese

1141

Cliffe (AJ) and Law (BA). **A time course study of peptide production in accelerated-ripened Cheddar cheese using reverse-phase high performance liquid chromatography.** *Food Biotechnology* 5(1): 1991; 1-17

The peptide and casein breakdown products of enzyme accelerated and normal Cheddar cheese were monitored during ripening using reverse phase high performance liquid chromatography and polyacrylamide gel electrophoresis (PAGE). In contrast to PAGE analysis, the water soluble N fraction analysed by reverse phase chromatography exhibited more significant difference in pattern. The size of one band detected by reverse phase chromatography related well to Cheddar flavour intensity. AS

1142

Satya Prasad (Y) and Mathur (MP). **Preparation of Cheddar cheese using immobilised proteases.** *Indian Journal of Dairy Science* 42(1): 1989; 33-38

During the lab. scale preparation of Cheddar cheese from soluble and immobilized rennet, longer setting times of curds were noted in later case which, however, were reduced significantly by the addition of 0.02% calcium chloride to the milk. In a similar way a slow acidity development during cheddaring was also avoided by reducing the setting temp. from 40 - 33 C. In the analytical studies conducted on the cheese samples during ripening period, a similar trend in respect of decrease in moisture and total protein contents was observed. However, the acidity development showed no particular trend whereas soluble protein content showed a gradual increase indicating the progress of ripening. At most study values were obtained in the cases of fat and salt contents. No significant difference was observed in the organoleptic scores of soluble and immobilized cheese samples ripened for 90 days. AS

1143

Singh (S) and Kanawjia (SK). **Influence of starter culture on sensory and biochemical characteristics of Cheddar cheese from buffalo milk.** *Indian Journal of Dairy Science* 42(1): 1989; 66-70

The trails were conducted to screen the starter cultures suitable for the manufacture of acceptable quality Cheddar cheese from buffalo milk. The cultures were procured from CHR-Hansens Lab., Denmark. The cultures were DRI-VAC 40, 44, 56, 70, 72 and 253. The Cheddar cheese was made by presalting method and ripened at 8 +/- 1 C for 12 months. The cheese samples were evaluated for sensory characteristics and analysed for biochemical changes during ripening. On the basis of sensory evaluation it was observed that the culture 44 resulted in the best final product. The cheese made with culture 72 and 253 showed flat and unclean defects. The rate of biochemical changes were highest in the cheese made with culture 44 and the lowest with 72. The suitability of starter culture found for the manufacture of acceptable quality Cheddar cheese was in the following decreasing order of 44, 40, 56 and 70 resp. AS

1144

Vandeweghe (P) and Reineccius (GA). **Comparison of flavour isolation techniques applied to Cheddar cheese.** *Journal of Agricultural and Food Chemistry* 38(7): 1990; 1549-1552

Three methods for the isolation of Cheddar cheese flavour (distillation, dialysis, and solvent extraction) were compared. The solvent extraction (acetonitrile) method gave the least concentrated isolate. It was, however, the fastest and cheapest and gave the most

characteristic flavour isolate of the three techniques. Dialysis yielded the most conc. flavour isolate. The gas chromatographic effluent was sniffed to determine odour character of the volatiles isolated. Many odour-active compounds, some of them in concn. below the detection threshold of the analytical instrument, contribute to Cheddar cheese flavour. While one component was characterised as being cheesey in character, it is felt that Cheddar cheese derives its characteristic flavour from a balance of many components. Four chemicals, 2-propanol, 1,3-butanediol, ---undecalactone, and γ-decalactone, were tentatively identified in Cheddar cheese for the first time. AS

1145

Laleye (LC), Simard (RE), Lee (BH) and Holley (RA). **Control of heterofermentative bacteria during Cheddar cheese maturation by homofermentative *Lactobacillus* starters.** *Journal of Dairy Science* 72(12): 1989: 3134-3142

Domiati cheese

1146

Darwish (SM), El-Deeb (SA) and Mashaly (RI). **Effect of *L. helveticus* cell-free extract on the concentration of Domiati cheese ripening rate at different salt concentrations.** *Indian Journal of Dairy Science* 42(1): 1989: 47-52

Four salted batches of Domiati cheese at rate of 5, 8, 10 and 15% were manufactured from cow's milk *L. helveticus* cell-free extract from suspension of 1.07×10^5 cells/ml. was added to each of the four batches. Control cheese was manufactured from 5% salted milk by the procedure described by Fahmi and Sharara (1950). The present results indicate that cheese manufactured with 5 and 8% salt gave the highest ripening indices and sensory scores. Higher salt concn. (15%) adversely affects the quality of the cheese. Domiati cheese with typical flavour, body and texture can be obtained after 30 days of pickling at 10C by adding cell free extract from *L. helveticus* to the cheese curd containing 5 or 8% salt directly after ladeling. AS

Ghee

1147

Sree (PS) and Darshan Lal. **Stability of butylated hydroxy toluene and butylated hydroxy anisole in ghee during heating.** *Indian Journal of Dairy Science* 42(1): 1989: 120-122

The study has shown that there is a rapid loss of antioxidant from ghee during continuous heating at various temp. The rate of destruction of antioxidant was slow at 100 C and increased with the increase in temp. of heating. SRA

1148

Subbulakashmi (G), Periwal (S) and Jhansi Rani (P). **Studies on shelf-life and utilisation of ghee residues.** *Journal of Food Science and Technology (India)* 27(3): 1990: 165-166

The nutritive value of the ghee residue obtained from Anatapur Dairy showed the protein content to be 34.8%, fat 60.4%, Ca 0.124% and P 0.539%. The shelf-life of the ghee residues in plastic, glass and tin containers for 90 days showed no significant changes in free fatty acids content, peroxide value and tintometer readings, though the storability in glass and tin containers as compared to plastic ones. Ghee residues could replace 100% of butter in cakes and the incorporation in cakes, biscuits and a few supplementary foods improved the flavour and the acceptability scores. AS

Ice cream

1149

Chittaranjan Das (T), Rama Rao (M), Reddy (CR), Krishnaiah (N) and Sudhakar (K). **Ice cream made by incorporation of different levels of potato pulp.** *Indian Journal of Dairy Science* 42(2): 1989: 295-297

The study of soft serve ice cream prepared with 15, 25 and 35% replacement of MSNF with boiled potato pulp indicated that incremental quality of potato pulp in ice cream mixes resulted in decrease in pH, sp. gr., protein, over run and increase in titratable acidity, relative viscosity and melting time. It was observed that the potato pulp could satisfactorily replace MSNF upto 25% without impairing organoleptic quality, with a reduction of 8.5% in the cost of production. AS

Khoa

1150

Sapre (M) and Deodhar (AD). **Biological activity of vitamin in milk during khoa preparation.** *Indian Journal of Dairy Science* 42(1): 1989: 27-32

The male albino rats having vitamin A difficiency were treated with milk and khoa prepared from standardised buffalo milk with 5% fat. The extent of improvement with respect to growth rate, liver wt., vitamin A content in liver and blood serum in these rats, when supplemented with 25 IU. Vitamin A from milk, khoa or purified vitamin were taken as indicators of biological activity. Rats receiving vitamin A supplements from milk and khoa showed

increase in the higher levels of serum hepatic vitamin A than synthetic vitamin A supplement and animals receiving vitamin A from milk or khoa were better in growth rate. Biological activity of vitamin A was higher for milk than khoa. During khoa preparation the biological activity of vitamin A decreased. Biological activity of vitamin A from milk and khoa was superior to synthetic media. SRA

1151

Ghatak (PK) and Bandyopadhyay (AK). **Chemical quality of khoa marketed in Greater Calcutta.** *Indian Journal of Dairy Science* 42(1); 1989; 123-124

57 samples of khoa were collected from the retail sweet dealer in Culcutta city and its surrounding areas and examined for colour, body texture and flavour. Results on the chem. quality of khoa indicate variations in moisture content (23.8 - 32.7%), ash (3.57 - 3.85%), lactose (19.37 - 21.25%), peroxide value (0.16 - 0.18) and in respect of fat 16 samples were within the limit (20 min). The variations could be seen in case of protein. SRA

1152

Patil (GR), Patel (AA), Garg (FC), Rajorhia (GS) and Gupta (SK). **Interrelationship between sensory and instrumental data on texture of khoa.** *Journal of Food Science and Technology (India)* 27(3); 1990; 167-170

Relationships between sensory texture descriptor and Instron texture profile (TP) parameters for khoa were studied to derive psychorheological models facilitating prediction of sensory texture from instrumental measurement. Significant correlations were observed between Instron hardness, sensory firmness, crumbliness, stickiness and smoothness. While Instron gumminess and chewiness showed similar or even better correlations with different sensory texture descriptors, instron springiness, cohesiveness and adehesive force exhibited relatively smaller correlations. Regression analysis indicated that combination of two or more TP parameters could be more useful in predicting various sensory texture descriptors particularly firmness, crumbliness and chewiness. Of all TP parameters only adehesiveness bore a definite correlations (P 0.05) with the overall sensory texture score (OTQ) of khoa, the relvant prediction equation explaining about 23% of OTQ. However all TP parameters included in the multiple regression analysis could predict about 60% variation in OTQ (P 0.05), which could be considered substantial in view of the complexicity of the product's texture. AS

Kulfi

1153

Ashokraju (A), Pasja Ali (M), Kondal Reddy (K), Reddy (CR) and Rama Rao (M). **Studies on the preparation and quality of Kulfi.** *Indian Journal of Dairy Science* 42(1); 1989; 127-129

Kulfi mix (indegenous milk product) was prepared by using fresh, clean and whole milk (5% fat and 9% SNF) and added sugar at 10% level by wt. and divided into 3 lots. The 3 lots of milk were concentrated to two-third (TS 35%), one-half (TS 48%) and one-third (TS 72%) of its original volume resp. Each mix was divided into. 1). mix without any stabiliser, 2). mix with added starch (3%) and 3). mix treated with sodium alginate (0.15%). These were cooled and kept at 40 C for 6 h. Addition of stabiliser showed reduced melt down property in all concn. of milk used. Addition of sodium alginate showed greater melt down resistance than addition of starch. Kulfi prepared with one-half concn. of milk scored higher for flavour than the other two. The overall acceptability was also more for kulfi prepared with one-half concn. Kulfi prepared with 3% starch showed superior score in all concn. of milk used. BV

Milk powder

1154

Ratnam (R), Verma (A) and Pitchumani (B). **Simple method to determine milk powder particle size distribution.** *Indian Journal of Dairy Science* 42(1); 1989; 39-41

Butter milk powder

1155

Ulberth (F). **A simple and rapid method for the quantification of phospholipids in skim milk/butter milk powder.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 190(5); 1990; 432-435

The application of a simple assay for the quantification of phospholipids in skim milk/butter milk powder is described. The phospholipids are extracted with methanol/chloroform, and the intact molecules react with a chromogenic reagent to form a Prussian blue complex. Results from the proposed method agreed favourably with results from the traditional method for the detn. in dairy products (r=0.951; n=40). Reduced requirements of organic solvents, simplicity of the procedure and minimized contamination risk from inorganic phosphorus are the main advantages of the method described. AS

Rasmalai

1156

Grewal (JS) and Tiwari (RP). **Microbiological quality of Rasmalai.** *Journal of Food Science and Technology (India)* 27(3): 1990: 178-179

Twenty five market samples of *rasmalai* showed a very high aerobic plate count which ranged from 10^2 - 10^6 CFU/g. *Staphylococcus aureus* was the most common isolate (76%) followed by *Escherichia coli* (72%) and *Klebsiella* (68%). The other organisms isolated were species of *Pseudomonas (52%),* Enterobacter *(44%),* Bacillus *(32%), and* Citrobacter (8%). However, no correlation could be established between the type of isolate with the total aerobic count. Samples having an aerobic count of 10^3 - 10^4 CFU/g yielded majority of the enteric organisms. Only isolate of *S. aureus* could be typed with the usual set of phages routinely used for typing clinical isolates. AS

Sandesh

1157

Sen (DC) and Rajorhia (GS). **Suitability of some packaging materials for packing sandesh.** *Journal of Food Science and Technology (India)* 27(3): 1990: 156-161

The effect of various packaging materials such as folding paper board cartons, polystyrene containers, high density polyethylene bags, nylon-6 pouches and tin cans on the shelf-life of soft grade buffalo milk *sandesh* stored at 30 +/- 1 C with 70% rh ('A' condition) and 7 +/- 1 C with 90% rh ('B' condition) was studied. At both the storage condition the max. chem., microbial and organoleptic deterioration were found in the *sandesh* samples packaged in the folding paper cartons followed by polystyrene containers, high density polyethylene bags, and nylon-6 pouches. Tin cans showed the best results. At 'A: storage conditions *sandesh* packaged in folding paper board cartons and tin cans became unacceptable on 6th day with respect to flavour, but their extent of deterioration differed in the two packages. At 'B' storage conditions *sandesh* remained acceptable up to 30 days in folding paper board cartons and 45 days in tin cans. Efforts were also made to prepare *sandesh* free from staphylococci but it was not successful. Acceptability of *sandesh* during storage reduced mainly due to flavour deterioration. AS

Wheys

1158

Balasubramanyam (BV), Singh (S) and Bhanumurthi (JL). **Precipitation of solids in whey from different sources.** *Indian Journal of Dairy Science* 42(2): 1989: 301-304

The cheese whey showed higher protein content than that in paneer and channa whey. The cheese whey, on heat treatment at 85 - 87 C at pH of 4.8 yielded max. whey solids on filtration, while in the case of paneer whey higher yield could be obtained in heating to 90 - 92 C for 10 min. at pH of 6.6. In the case of channa whey the recovery of whey protein by heat precipitation was so small that it is economical to process the whey. The chem. comp. reveals that the cheese whey solids contain more proteins and lactose while the paneer whey solids showed higher fat and ash content. AS

1159

Halpin-Dohnalek (MI) and Marth (EH). **Fate of *Staphylococus aureus* in whey, whey cream, and whey cream butter.** *Journal of Dairy Science* 72(12): 1989: 3149-3155

Fresh Cheddar cheese whey was inoculated with ca. 10^6 *Staphylococcus aureus*/ml and held at 4, 25, and 37 C for 48 h. Numbers of staphylococci decrease in whey at 25 and 37 C and decreased or remained constant in whey at 4 C. When Cheddar cheese whey was neutralized with sodium hydroxide before inoculation with ca. 10^2 or 10^6 *S. aureus*/ml, numbers of the bacterium increased at all incubation temp. Viability of *S. aureus* strains in whey butter made from inoculated whey cream (from Cheddar cheese whey) was determined. Whey cream was either neutralized to a titratable acidity of .15% or untreated before inoculation with ca. 10^4 *S.aureus*/ml. Butter churned from the whey cream was held at 4, 25 and 30 C for up to 4 wk. Viability of *S. aureus* was enhanced in lightly salted (1%) whey cream butter and in butter made from neutralized whey cream. Strains of *S. aureus* did not survive in unsalted or in salted (1.5%) butter made from untreated whey cream. AS

Yoghurts

1160

Salji (JP). **The micracle food.** *Food Science and Technology Today* 3(4): 1989: 228-231

This article covers yoghurt's (a fermented dairy product) historical background, geographical distribution processing and manufacture, comp., nutritive value, therapeutic value, inhibitory substances, lactose intolerance, relationship to nitrosamines, cholesterol, cancer and antibiotics, food for astronauts, prolongation of life, putrefactive

bacteria and dead or live yoghurt. 15 references. SRA

1161

Lacroix (C) and Lachance (O). **Effect of various humectants and water activity on proteolysis, yeast and mold growth and shelf-life during cold storage of yoghurt.** *Canadian Institute of Food Science and Technology Journal* 23(2/3): 1990: 101-108

Milk proteins

Caseins

1162

Gupta (VK) and Mulay (CA). **Studies on sodium and calcium caseinates prepared from fresh and sour buffalo milk edible caseins. Part. I.Chemical and reconstitution properties.** *Indian Journal of Dairy Science* 42(1): 1989: 60-65

Na and Ca caseinates were prepared from each of edible casein batches from fresh, 0.2 +/- 0.02, 0.3 +/- 0.02 and 0.4 +/- 0.02% T.A. milks. These caseinates werre studied for their chemical and reconstitution properties. Na and Ca caseinate sample had, on av., 3.7 to 4.3% moisture, 90.2 to 90.7% protein, 1.1 to 1.4% fat, 3.90 to 4.2% ash, 0.90 to 0.13% lactose and 6.7 to 6.9% pH. Edible caseins from different acidity milks did not significantly affect pH, solubility index and sinkability, but affected the dispersibility highly significantly (P 0.01) and wettability significantly of Na (P 0.05) of Na and Ca caseinates. Average dispersibility of Na caseinate samples from fresh, 0.2 +/- 0.02, 0.3 +/- 0.02 and 0.4 +/- 0.02% T.A. milk edible caseins were 73.2, 73.7, 93.9 and 86.5% resp., whereas the respective values for Ca caseinate samples were 25.8, 25.7, 38.4 and 39.5. Average wettability time for Na caseinate samples from fresh, 0.02 +/- 0.02 , 0.3 +/- 0.02 and 0.4 +/- 0.02% T. A milk edible were 126, 112, 130 and 145 min., resp. The respective av. wettability time for Ca caseinate samples were 30, 22, 28 and 34 seconds. Ca caseinates had highly siginificantly (P 0.01) greater solubility index and sinkablity compared to sodium caseinates. Av solubility index ranged between 1.1 - 2.3 and 6.8 - 8.5 ml, for Na and Ca caseinates resp. AS

1163

Chandeshwar Prasad and Balachandran (R). **Electrophoretic and chromatographic patterns of caseins of buffalo milk concentrate.** *Indian Journal of Dairy Science* 42(1): 1989: 82-86

Studies were made to fractionate and elute the casein micelles obtained from raw milk and sterilized buffalo milk on polyacrylamide gel and on sephadex G-100 resp. Distinct change in aggregation and disaggregation of casein micelles through the appearance and disappearance of different peaks in elution profile and changes in number of bands and their mobility in gel matrix of polyacrylamide gel is observed. SRA

1164

Chandeshwar Prasad and Balachandran (R). **Electorophoretic mobility and chromatographic patterns of caseins of stored buffalo milk concentrate.** *Indian Journal of Dairy Science* 42(2): 1989: 171-184

Studies were conducted to elucidate the status of protein fractions obtained from freshly prepared and stored (30 - 37 C) sterilized buffalo milk conc. by electrophoretic mobility on polyacrylamide gel and by elution profile from chromatography through Sephadex G-100 column. The results indicated that the distinct changes in aggregation and disaggregation of proteins through the appearance of different peaks in elution profile on Sephadex column. At high total solids more coalescence of proteins took place initially in stored samples at 30 and 37 C storage in contrast to fragmentation of protein at lower total solids (25% T.S.). Aggregation of proteins were faster at storage temp. of 37 C compared at 30 C. However poly acrylamide gel electrophoresis gave rise to only two bands upto third month of storage both at 30 and 37 C but at the end of sixth month one band was noticed with reduced mobility for 30% and 35% T.S. conc. Thus these results also confirm the aggregation of proteins during storage. AS

MEAT AND POULTRY

Meat

1165

Rubin (LJ), Diosady (LL) and O'Boyle (AR). **A nitrite-free meat-curing system.** *Food Technology* 44(6): 1990: 130

1166

Mason (LH), Church (IJ), Ledward (DA) and Parsons (AL). **The sensory quality of foods produced by conventional and enhanced cook-chill methods.** *International Journal of Food Science and Technology* 25(3): 1990: 247-259

This paper review the literature available on the sensory quality of foods produced by conventional

and enhanced and cook-chill methods. Most attention has been paid to meat products. Conventional cook-chill, meat and meat products, other foods and complete meals, enhanced cook-chill techniques are the aspects covered. 68 references. SRA

1167

Fogerty (AC), Whitefield (FB), Svoronos (D) and Ford (GL). **Changes in the composition of the fatty acids and aldehydes of meat lipids after heating.** *International Journal of Food Science and Technology* 25(3): 1990: 304-312

1168

Prabhakar (K) and Ramamurthi (R). **A study on the preparation of intermediate moisture meat.** *Journal of Food Science and Technology (India)* 27(3): 1990: 162-164

A study was planned to develop a safe, effective and cheap preservation system for extending the storage life of meat at ambient temp. using the principle of intermediate moisture (IM) meat technology. A processing procedure was standardised by inclusion soaking of buffalo meat samples in a solution of humectants:glycerol (2.0%) and NaCl (10.0%), chem. preservatives: trisodium citrate (2.0%) and sodium benzoate (0.2%) followed by mild heat treatment and air drying. Mean, % net yield of IM product was 49.67. Samples revealed pH in the range of 5.72 - 5.79, water activity of 0.84 - 0.88, % moisture of 47.52 - 42.73 and percentage residual salt content of 10.97 - 9.58. Sensory evaluation indicated no spoilage in the IM meat samples during the ambient temp. storage of 2 months with acceptable palatability. AS

1169

Anjaneyulu (ASR), Kondaiah (N), Salahuddin (M) and Panda (B). **Quality of patties from chicken, mutton and combination of meats.** *Journal of Food Science and Technology (India)* 27(3): 1990: 184-185

Quality of patties made from the meat of spent hens, old sheep and their combination was evaluated. Chicken emulsion had significantly higher pH, protein and emulsion stability than mutton emulsion. Combination of meats had significantly poor emulsion stability, patties yield and greater reduction in patties diameter. Yield and comp. of chicken and mutton patties were not different significantly. Appearance, flavour and overall acceptability of chicken patties were significantly better than the patties of combination of meats which were markedly better than mutton patties. AS

1170

Chikuni (K), Ozutsumi (K), Koishikawa (T) and Kato (S). **Species identification of cooked meats by DNA hybridization assay.** *Meat Science* 27(2): 1990: 119-128

1171

Kenney (PB) and Hunt (MC). **Effect of water and salt content on protein solubility and water retention of meat preblends.** *Meat Science* 27(2): 1990: 173-180

Beef

1172

Purchas (RW). **An assessment of the role of pH differences in determining the relative tenderness of meat from bulls and steers.** *Meat Science* 27(2): 1990: 129-140

1173

Stanton (C) and Light (N). **The effects of conditioning on meat collagen: Part 4.The use of pre-rigor lactic acid injection to accelerate conditioning in bovine meat.** *Meat Science* 27(2): 1990: 141-159

Injection of fresh bovine muscle with 0.1 M lactic acid (to a level of 10% of original muscle wt.) resulted in a pH decline to a min. pH of 5.33 at 15 C only 3 h after injection. Untreated muscle reached the same pH after 26 h when held at the same temp. Fresh, unconditioned meat colour was unaffected by pre-rigor 0.1 M lactic acid injection as assessed by visual inspection. The percentage of perimysial collagen extracted as the soluble form was significantly higher (P 0.05) from three muscles of varying quality when pre-injected with 0.1 M lactic acid and conditioned from 1 to 14 days, than from conditioned untreated muscles. SDS-polyacrylamide gel electrophoresis of CNBr peptides from insoluble perimysium obtained from three muscles of varying quality revealed no obvious differences due to pre-rigor lactic acid injection before conditioning. However, analysis of the high molecular wt. perimysial collagen CNBr peptides from lactic acid treated muscles by two-dimensional SDS-polyacrylamide gel electrophoresis revealed an increased incidence of degradation in this region compared with untreated controls. These data strongly suggest that pre-rigor injection of beef muscle with lactic acid may accelerate conditioning. The implications of this finding are discussed. AS

1174

Echevarne (C), Renerre (M) and Labas (R). **Metmyoglobin reductase activity in bovine muscles.** *Meat Science* 27(2): 1990: 161-172

Mutton

1175

Zapata (JFF), Ledward (DA) and Lawrie (RA). **Preparation and storage stability of dried salted mutton.** *Meat Science* 27(2): 1990: 109-118

Minced (8 or 18 mm plate) mutton with salt (25%) and sorbate (0.4%) was pressed into cakes about 11 cm in diameter and 3 cm high. The cakes were partially dried in an air oven at 40 C for 48 h to a water activity of about 0.75. The cakes were packed, either in vacuo or in air, and stored at 30 or 2 C for up to 60 days. Objective assessment of quality showed that these dried salted meats can be kept for up to 60 days at 30 C with little loss of textural or nutritional quality although some fading, due to haemoprotein breakdown, occurs. Packaging in vacuum, however, minimises this loss of colour and would be recommended for centralises manufacture prior to distribution in developing, tropical countries. AS

Sheep

1176

Warris (PD), Kestin (SC), Young (CS), Bevis (EA) and Brown (SN). **Effect of preslaughter transport on carcass yield and indices of meat quality in sheep.** *Journal of the Science of Food and Agriculture* 51(4): 1990: 517-523

One hundred and sixty castrated male crossbred lambs were fed a complete pelleted diet *ad libitum* for 4 wks prior to slaughter at a live wt. of about 32 kg in two trials carried out in June and November 1984. They were killed after no transport on the day of slaughter or a journey lasting for 1, 3 or 6 h. Transport had no significant effect on the wt. of any body components measured. However, although the effect was not statistically significant ($P = 0.25$), sheep transported for 3 or 6 h produced slightly lighter (1.7%) carcasses than those either not transported or subjected to a 1-h journey. Transported sheep had higher concn. of plasma glucose and liver glycogen, and lower levels of plasma free fatty acids and urea N. Muscle glycogen, pH_u or water holding capacity were not influenced by transport, but fibre optic probe value was lower in sheep transported for 1 h than in those transported for 6 h. No differences were found between the results of the two trials, suggesting that season was not important in determining the responses of sheep to transport. AS

Lambs

1177

Moore (VJ). **Factors influencing frozen display life of lamb chops and steaks.Effect of packaging and temperature.** *Meat Science* 27(2): 1990: 91-98

Frozen lamb loin and rib chops and leg steaks were wrapped in film of high oxygen permeability or vacuum packaged in film of low oxygen permeability and stored in the dark at -10, -20 or -35 C for periods from 0-20 wks. After storage, the wrapped cuts were displayed in an open-top cabinet operating at -20 C under continuous fluorescent lighting (Philips Deluxe 32 degree). Cuts were evaluated by a trained colour panel to determine acceptable display life, and chop lean colour was evaluated using a Hunter colorimeter. Cuts wrapped in oxygen permeable film had better colour retention during storage and display. Storage of the frozen chops reduced the display life, with the largest effect occurring during the first 4-5 wks storage. Cuts stored at -10 C had no display life after 10 wks storage, whereas cuts stored at -20 and -35 C had some acceptable display life even after the longest storage period tested. Rib chops in general had better colour stability than loin chops. AS

Pork

1178

Clarke (AD), Ramsey (CB), Hornsby (VE), Davis (GW) and Galyean (RD). **Effects of antioxidants on visual and palatability attributes of hot and cold processed pork lion chops.** *Lebensmittel-Wissenschaft und - Technologie* 23(3): 1990: 267-270

1179

Yasuhara (A) and Shibamoto (T). **Head space volatiles from heated pork fat.** *Food Chemistry* 37(1): 1990: 13-20

1180

Monahan (FJ), Buckley (DJ), Gray (JI), Morrissey (PA), Asghar (A), Hanrahan (TJ), Lynch (PB). **Effect of dietary vitamin E on the stability of raw and cooked pork.** *Meat Science* 27(2): 1990: 99-108

Products

1181

Roce (M) and Incze (K). **Fermented sausages.** *Food Reviews International* 6(1): 1990: 91-118

General characteristics of the products, changes occurring during fermented sausage production (biochemical changes, physical changes, chemical changes and microbial changes) are covered in this review. 206 references. SRA

Meat

Bologna

1182

Barbut (S). **Effect of three chopping methods on bologna characteristics.** *Canadian Institute of Food Science and Technology Journal* 23(2/3): 1990: 149-153

Poultry products

Eggs

Egg white

1183

Markov (E), Tscheuschner (H-D) and Winkler (D). **Methods of the determination of the gel formation properties of dried egg white.** *Lebensmittelindustrie* 37(1): 1990: 8-10 (De)

SEAFOODS

Crabs

1184

Flament (I). **Analysis of boiled crab meat flavour.Identification of new alcoholic constituents.** *Lebensmittel-Wissenschaft und - Technologie* 23(3): 1990: 274-275

19 alcohols have been identified in a crab extract. 3,5,5,-trimethyl-1-hexanol, and 1-methyl-cyclohexanol were discovered for the first time in a food system. BV

Frogs

1185

Rajagopalan (D), Deshpande (CK) and Leela Joshi. **Estimation of D $_{10}$ value for *Salmonella* serotypes isolated from processed frozen frog legs.** *Fishery Technology* 27(2): 1990: 160-161

Sensitivity of *Salmonella* serotypes isolated from processed frozen frog legs to γ-irradiation was studied and D $_{10}$ value (dose required for 90% irradiation) was calculated by ploting a graph of the log of the survival of the microbial population against the irradiation dose. D $_{10}$ value was lowest for *S. concord* with 35 Krad and highest value of 70 K was shown by *S. hvittfoss*. 6 serotypes of *Salomenlla* showed values between 40 and 50 Krad, 5 serotypes between 50 and 60 Krad and 2 serotypes between 60 and 70 Krad. SRA

Seal

1186

Shahidi (F) and Synowiecki (JNaczkM). **Seal meat - A potential source of muscle food. Chemical composition, essential amino acids and colour characteristics.** *Canadian Institute of Food Science and Technology Journal* 23(2/3): 1990: 137-139

Fish

1187

Subrata Basu. **Dried fish-cereal mixture.** *Fishery Technology* 27(2): 1990: 162-163

A convenient nutritious dried product was developed from Sciacnid (*Lutjanus*sp.) after mixing with rice flour in (1) 1:1 and (2) 1:2 proportion for use in the preparation of soups, stews and such other wet foods. The mixture of meat and rice was sun-dried and the powdered product was packed in 200 guage polythene bags and stored for 240 days. The products (1 and 2) contained 26.80 and 18.20% protein resp. and 1.22% fat. The moisture content increased slowly from 9.64 - 12%. The total volatile basic N value was less than 40 mg %; total bacterial count slowly increased to a final value of 1.9 x 10^7/g. There was no mould growth, insect infestation and discolouration. Overall acceptability of the soup was high upto 175 days of storage. SRA

1188

Nirmala Thampuran and Mahadeva Iyer (K). **Production of hydrogen sulphide and other volatile sulphides by spoilage bacteria from fish.** *Fishery Technology* 27(2): 1990: 145-150

The performance of peptone iron agar (PIA), lead acetate agar (LA), Kilger iron agar (KIA), modified Long and Hammer's medium (L and H) and tryptone soytone agar (TSA) for enumerating hydrogen sulphide producing spoilage bacteria in marine fishes were evaluated. The actual number of black colonies, developed, ease of detection and enumeration and the time required for the development of black colonies are the factors considered. The counts of hydrogen sulphide producers were almost comparable in all the media except KIA where lowest count was noticed, and they were intense black within 18 h. The colonies of LA were greyish and took 48 h; L and H medium and TSA were equally good for the count. When the individual cultures were tested for sulphide production 60% of the samples were positive by lead acetate filter paper strips, 55% by DTNB strips and

51% by iron agar slants. However, for *Aeromonas* and *Alcaligenes* spp. lead acetate strips provided max. positive results, and KIA showed lower detection rate. Study also points to the different types of spoilage flora of fish on the basis of the production of volatile sulphides. *Aeromonas* sp. were the major flora followed by *Vibrio*, *Alteromonas putrefaciens* and *Pseudomonas* sp. SRA

1189

Veer (MP), Bhat (UG) and Shanmukhappa (H). **Copper, chromium and manganese in some fishes of Kali estuary, Karwar.** *Fishery Technology* 27(2): 1990: 112-114

Content of trace metal like Cu, Cr and Mn in the gills, muscles, and whole body of *Mugil cephalus*, *Sillago sihama*, *Leiogomathus berlivirostris*, and *Gerrromorpha setifer* were determined. The concn. of the metals in the body parts varied from sp. to sp. Trace metal in *M. cephalus*, *S. sihama* and *L.berlivirostris* in whole body in the order Mn Cr Cu, whereas in *G. seetifer* the order was Cr Cu Mn. The range in values (p.p.m) after concn in whole body of these fishes Cu 5.46 - 11.83, Cr was 8.28 -12.29, and Mn was 5.20 - 15.90. There was a significant relationship between trace metal abundance in gills and whole body in all sp. except *M. cephalus*. These trace metal are within safety limits in edible parts of the fish. SRA

1190

Lekshmy Nair (A), Jose Stephen and Gopakumar (K). **Nutritive value of edible meat powder and meal from three fatty deep sea fishes.** *Fishery Technology* 28(1): 1991: 67-72

The paper reports on the nutritional quality of meals prepared from 3 fatty deep sea fishes (*Chlorophthalmus agassizi*, *Pseneopsis oysnea*, and *Epinuula orientalis*) and the edible meat powder prepared from one of them. The yield of edible meat powder from *P.cyanea* was 12.0%; yield of meals from *P.cyanea* was 24.70% from *C.agassizi* with stick water was 24% and without stick water was 20.60% and from *E. orientalis* was 30% fat content of the edible meat powder was 36.67%; the meals were deep brown and extremely oily. The yield of fish meal in *C.agassizi* was increased by 3.4% by addition of stick water. The fat content of fish meal varied from 18.6 - 44.0%. Essential amino acids in the samples ranged from 35.4 - 45.1 g/100g protein. Leucine, cysteine, methoinine, threonine and valine were the limiting amino acid of fish meal, but the edible meat powder from *P. cyanea* had all the essential amino acids in sufficicent quantities. PER of the edible meat powder was 2.41 (caseins 2.50 plus or minus 0.23); the PER of meal from *C. agassizi* with stick water was 2.54. SRA

1191

UNIDO. **Industrial development strategies for fishery system in developing countries.** *Food Reviews International* 6(1): 1990: 1-65

Review. SRA

1192

Mukherjee (S), Bandyopadhyay (S) and Bose (AN). **An improved solar dryer for fish drying in the coastal belt.** *Journal of Food Science and Technology (India)* 27(3): 1990: 175-177

A 'green-house' type solar dryer of dimensions 3 m x 2.5 m was designed and constructed for fish drying. It has a rigid and hygienic construction consisting of a black-pointed G. I. sheet chamber covered with plexiglass sheets and provided with ventilation holes at the east-west sides and exhaust at the top. The max. temp.-rise over ambient was 18 to 24 C. The dryer was installed and put to trial for fish drying in a coastal fishing harbour. It was possible to dry fresh fish of mixed var. and size to the desired moisture content within 2 - 3 days. The dryer with a designed capacity of 56 kg fresh fish per batch was suitable for adaptation by fisherman-processor families in the coastal belt. AS

Acetes

1193

Ramananda Rao (D) and Sridhar (R). **A note on the bisulphite treated dried *Acetes*.** *Journal of Food Science and Technology (India)* 27(3): 1990: 186-187

Fresh, wet *Acetes* were treated with 0, 0.5, 1.0 and 1.5% concn. of sodium bisulphite solution, for 5 min at 28 C. The material after draining were dried in Torry Kiln to 10% moisture level, packed in sealed air tight containers and stored for 45 days. The samples treated with 0.5 and 1.0% bisulphite solutions decreased from their initial values of 4.18 and 4.61 to 2.46 and 2.88 resp., while those treated with 1.5% bisulphite solution decreased from the initial 4.17 to 3.28 during storage for 45 days. Treating *Acetes* with 1.5% sodium bisulphite prior to drying helped in retention of good colour. AS

Catfish

1194

Bhattacharyya (SK) and Chaudhuri (DR). **Studies on storage characteristics of *Clarius batrachus* at different temperatures.** *Fishery Technology* 27(2): 1990: 127-129

The post mortem changes in *C. batrachaus* (a commercially important catfish) on storage at 22 plus or minus 2 C and 89 plus or minus 3% rh incubation temp. of 37 plus or minus 1 C and 100% rh and in ice (0 - 2 C) has been studied. Results show that *C. batrachus* deteriorates with gradual increase in total bacterial counts, total volatile N and decrease in nucleotide and organoleptic acceptability. The loss in the acceptability was due to soft texture and flat taste but no off-flavour was found. The fish was acceptable in storage for 8.5 h at 22 C, 6 h at 37 C and 15 days in ice. SRA

Halibut

1195

Das (M) and Mishra (B). **Studies on certain aspect of nutritive value of Indian halibut, *Pasetodes erumei* with special reference to its body asymmetry.** *Fishery Technology* 27(2): 1990: 103-108

The body of the *Psettodes erumei* has beren analysed separately for fat, protein, ash, K, Na, P, Ca, Fe after demarcating into Region 1 (behind head upto 30th dorsal fin ray) Region 2 (33rd - 45th dorsal fin ray) Region 3 (46th dorsal fin ray to end of caudal penducle). The halibut contained 18.79% protein and 0.55% fat. Fat content on the blind side is 70% higher than that of the occular side. The mineral content is almost similar to other fishes with the exception of low Ca content (0.04%). The 3 regions showed much difference in fat, P, and K contents. The total edible portion of the fish was 56.24% of which occular side is about 23% higher than the blind side. SRA

Krill

1196

Suzuki (T) and Shibata (N). **The utilization of Antartic krill for human food.** *Food Reviews International* 6(1): 1990: 119-147

Krill biology and fisheries (taxonomy of krill, stock size of krill, fisheries), chem. comp. of Antartic krill (lipids, vitamins and minerals, amount and characteristics of protein, components of taste and smell), nutritive value of krill, processing on ships (conditions required for processing krill, commercial products being developed as human food), krill used in various processed food are covered in this review. 49 references. SRA

Milk fish

1197

Jiang (S-T), Tsao (C-Y), Wang (Y-T) and Chen (C-S). **Purification and characterisation of proteases from milkfish muscle (*Chanos chanos*).** *Journal of Agricultural and Food Chemistry* 38(7): 1990: 1458-1463

Salmon

1198

Gardiner (MA). **Survival of *Anisakis* in cold smoked salmon.** *Canadian Institute of Food Science and Technology Journal* 23(2/3): 1990: 143-144

This study was performed in order to determine if the *Anisakis* or *Diphyllobothrium* larvae found in fresh (unfrozen) salmon survived the cold smoking process. Samples from 10 sides of fresh salmon were examined for parasites. *Anisakis* larvae were found ranging from 1 - 3/200g or and average of 0.6/fresh side. In comparison in fresh cold smoked salmon, *Anisakis*, were found ranged from 1 - 5/200g or and average of 1.2/side. All parasites found in both the fresh and cold smoked salmon were alive. In addition two sides of cold smoked salmon were analysed after storage for 27 days at refrigeration temp. (4 C) and were found to have live parasites *Diphyllobothrium* were not found in any of the 20 sides of salmon examined. AS

Sardines

1199

Shetty (TS) and Setty (TMR). **Bacteriology of Indian oil sardine (*Sardinella longiceps valenciennas*) stored in chilled sea water.** *Fishery Technology* 27(2): 1990: 141-144

The initial total plate count (TPC) of fresh fish was 3.6×10^3/g which increased to 8.1×10^7/g during storage in chilled (2 plus or minus 1 C) sea water (CSW). The TPC of the medium surrounding the fish also increased as that of the fish. Gram negatives (60.0%) dominated over Gram positives (40.0%) in freshly caught sardine. Among the Gram positives, *Micrococcus* spp. and *Bacillus* spp. were dominant and Gram negatives, *Flavobacterium* spp. followed by *Pseudomonas*spp., *Acinetobacter* spp., *Vibrio* spp. and *Aeromonas* spp., were predominant. As the spoilage advanced the Gram negatives dominated the flora in the order *pseudiomonas* spp., *Vibrio* spp., *Flavobacterium* spp., *Acinetobacter* spp., *Aeromonas* spp. and *Moraxella* spp. Gram negatives were dominated in the freshly collected sea water with higher incidence of *Vibrio* spp., and *arthrobacter* spp. The distribution pattern of different bacterial genera of the CSW media surrounding the fish, during the storage is almost similar to that of fish. SRA

1200

Beltran (A) and Moral (A). **Keeping quality of vacuum-packaged smoked sardine fillets:.Biochemical and organoleptic aspects.** *Lebensmittel-Wissenschaft und - Technologie* 23(3): 1990: 255-259

The effect of mixed smoking (2 h at 30 C, 45 min at 75 C) on the keeping quality of sardine caught in mediterranean sea in march and june was studied. Biochemical and sensory analysis were carried out over 120 days of storage at 1 C and - 18 C. Smoking to some extent inhibited autoxidation during storage. Hydrolysis was the main cause of lipid degradation during chilling. The amount of characteristics smoked flavour components present was related to both storage temp. and fat content of the sardine. A statistically significant decrease (P less than or equal to 0.05) in the phenolic compound content was recorded in the batchs stored at -18 C, while the sardine with higher fat levels exhibited greater absorption of phenolic compounds during smoking. Sensory analysis indicated that, under the conditions tested, freezing was an appropriate method of storing smoked sardine for upto 4 months. Alteration in texture took place in the chilled smoked sardine that adversely affected its quality and limited storage life. AS

1201

Roussel (H) and Cheftel (JC). **Mechanisms of gelation of sardine proteins: Influence of thermal processing and of various additives on the texture and protein solubility of Kamaboko gels.** *International Journal of Food Science and Technology* 25(3): 1990: 260-280

1202

Lubis (Z) and Buckle (KA). **Rancidity and lipid oxidation of dried-salted sardines.** *International Journal of Food Science and Technology* 25(3): 1990: 295-303

Several methods (rancidity scores and chem. assessment) are used to establish relationship between changes in perceived rancidity and changes in the lipids (thiobarbituric acid reactive substances, diene conjugation, flourescent products, polyene index) of two sources of dried-salted sardines during storage (24 weeks) at refrigeration, ambient temp. and tropical ambient temp. The non-enzymic browning of the samples was also evaluated. The formation of flourescent product and PI showed a strong correlation with rancidity scores with all types of samples. Only two of the 5 indices ie., polyene index and the presence of flourescent products showed a significant correlations (P 0.01) with rancidity score. SRA

Tilapia

1203

Akande (GR). **Improved utilization of stunted *Tilapia* spp.** *International Journal of Food Science and Technology* 24(5): 1989: 567-571

1204

Jiang (S-T), Wang (Y-T), Gau (B-S) and Chen (C-S). **Role of pepstatin-sensitive proteases on the postmortem changes of tilapia (*Tilapia nilotica* x *Tilapia aurea*) muscle myofibrils.** *Journal of Agricultural and Food Chemistry* 38(7): 1990: 1464-1468

Products

1205

Lakshminatha Reddy, Shetty (TMR) and Dora (KC). **Utilization of low value fish. 1.Preparation of fish fingers and croacker and perches.** *Fishery Technology* 27(2): 1990: 133-137

Fish finger were prepared from fresh croaker (mixture of fish, belonging to Sciaenids) and pink perch (*Nemipterus japonicus*) collected from landing centre by mincing with the addition of additive, extruded and sliced into 6 cm pieces. Dipped in bater solution and rolled in the breading mix, packed in polythene bags and stored at -20 C. The yield percentage (av. wt. before breading, after breading and after frying) trimethylamine N (TMAN) and total volatile base N (TVBN) were estimated. They were analysed for aerobes and for *E. coli*, *Salmonella*, *Vibrio* and *Staphylococcus aureus*. The yield of picked meat was 30% in croacker and 37% in pink perch. The av. wt. of croaker finger was 9.3 and pink perch was 9.7 g. The moisture content in both fingers were 5 - 7%. The protein content of croaker and pink perch fingers after frying were 20.3 and 22.4% resp. The TMAN and TVBN values during processing in the preparation of fish finger increased slightly. There was gradual increase in PV, TBA and FFA values during processing. Slightly higher counts (1.68×10^6/g and 1.64×10^6/g) for croaker and pink perch were noticed. There was a slight increase in the bacterial load of paste and fingers, possibly due to addition of various ingredients; the aerobic and mesophilic spore count of some of the ingredients are given. SRA

1206

Hastings (RJ), Keay (JN) and Young (KW). **The properties of surimi and Kamaboko gels from nine British species of fish.** *International Journal of Food Science and Technology* 25(3): 1990: 281-294

The preparation and properties of surimi and derived kamaboko gels from a range of British-caught sp. of teleost (or bony) fish including white fish (fillets), trimmings and skeletons. Fatty fish and an elasmobranch (or cartilaginous) fish was studied. Cod, haddock and whiting fillets and trimmings of haddock and whiting yielded surimi and derived gels with functional properties (texture, water-binding capacity and colour) most closely approaching those of the Alaska Pollack surimi used as standard. Saithe gave a gel which was firm and elastic but which had a low water-binding capacity and was dark in colour. Most of the fatty species studied provides surimi in relatively high yield and in some respect the texture was good, but colour and water-binding capacity are inferior to pollack surimi. BV

PROTEIN FOODS

Nil

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

Alcoholic beverages

Beer

1207
Fukui (N), Nakatani (K), Kanagawa (K) and Nagami (K). **The role of α-glucosidase of brewing yeast in high gravity brewing.** *Technical Quarterly, Master Brewers Association of America* 26(4): 1989: 134-138

The influence of sugar assimilation and fermentation conditions on the growth of yeast cells and the behavior of intracellular α-glucosidase activity throughout the whole fermentation process were analysed and the results showed that the specific activity of α-glucosidase in yeast cells during the stationary phase in yeast growth was related to the sorts of sugar which were assimilated during the growth phase. When the yeast cells which proliferated utilising glucose increased, both the specific activity of α-glucosidase during stationary stage and assimilation velocity of maltose decreased and increase of pitching rate was very effective to accelerate the maltose assimilation by increasing both the specific activity of α-glucosidase during the stationary stage and the max. number of yeast cells in the fermenting wort. SRA

1208
Pajunen (E), Gronqvist (A) and Lommi (H). **Continuous secondary fermentation and maturation of beer in an immobilized yeast reactor.** *Technical Quarterly, Master Brewers Association of America* 26(4): 1989: 147-151

The technical and commercial aspects of a small industrial scale continuous secondary fermentation and maturation process is described, where secondary fermentation times are reduced from a typical 10 - 14 days to 2 - 3 h, followed by standard stabilisation and bottling. The results indicate that the shortened maturation time can lead to considerable savings in the construction of the secondary fermentation area as well as in operation itself. The savings will be greatest when additional lagering and maturation capacity is needed either in existing plants or is being constructed in new breweries. SRA

1209
Theaker (PD), Clarke (BJ), Currie (BR) and Gough (AJ). **Pesticides and brewing materials-Reasons, regulations and residues.** *Technical Quarterly, Master Brewers Association of America* 26(4): 1989: 152-160

Review. 29 references. SRA

Brewing

1210
Collins (GE). **Precision flow measurement in the brewing industry today.** *Technical Quarterly, Master Brewers Association of America* 26(4). 1989: 123-126

The importance of accurate flow measurement in brewing industry is described, and product consistency, quality and taste uniformity are discussed. The importance of high gravity brewing is explained. Clear definitions of accuracy and repeatability are presented. Explores technologically advanced versions of the positive displacement flow meter, the mass flow meter and electro-magnetic flow meter with their operating principles, advantages and disadvantages. Applications such as batch mixing, on-stream blending with internal custody and inventory control are presented. SRA

Non-alcoholic beverages

Coffee

1211
Deiniger (D) and Richter (R). **Analysis of the water content in raw coffee with the ^{1}H-NMR impulse** spectroscopy. *Lebensmittelindustrie* 37(1): 1990: 21-22 (De)

The authors examined the application of the ^{1}H-NMR method for the simple and quick analysis of the water content of raw coffee. They deal with the ^{1}H-NMR signal and the ascertainment of the experimental parameters and the exactness of the method. The evaluation of the FID signal can be applied for quick analysis of the water content on basis of calibration measurements. AS

Fruit juices

1212
Beaudry (EG) and Lampi (KA). **Membrane technology for direct-osmosis concentration of fruit juices.** *Food Technology* 44(6): 1990: 121

Direct-osmosis concn. and innovation in the field of membrane separation allows-the concentrating of juices with high concn. of both dissolved and suspended solids, without significant fouling of the membrance. The process can be performed at low pressures on "Cold" (refrigerated or room temp.) juices. This protects the product from flavour deterioration and loss of essences normally experienced with the high temp. of evaporators. BV

1213
Plowman (JE), Love (JL) and Herbert (BR). **Enzyme induced loss of sucrose in berry fruit juices.** *International Journal of Food Science and Technology* 24(5): 1989: 521-527

Varied concn. of sucrose have previously been reported in freshly picked berry fruits. It was observed that sucrose in juice extracts from berries decreased markedly with time. The loss of sucrose added to raspberry and loganberry juice is attributed to the action of the enzyme, invertase. Heat inactivation immediately after picking reduced the loss of sucrose in raspberries and blackberries. Knowledge of these changes might influence the methods of harvesting, storage and processing. AS

Apple juices

1214
Spanos (GA), Wrolstad (RE) and Heatherbell (DA). **Influence of processing and storage on the phenolic composition of apple juice.** *Journal of Agricultural and Food Chemistry* 38(7): 1990: 1572-1579

Citrus juices

1215
White (DR). **Determination of 5-methyltetrahydrofolate in citrus juices by reversed-phase high-performance liquid chromatography with electrochemical detection.** *Journal of Agricultural and Food Chemistry* 38(7): 1990: 1515-1518

Grape juices

1216
Spanos (GA) and Wrolstad (RE). **Influence of processing and storage on the phenolic composition of Thompson seedless grape juice.** *Journal of Agricultural and Food Chemistry* 38(7): 1990: 1565-1571

Tea

1217
Owuor (PO), Navu (RM) and Muritu (JW). **Plucking standard effects and the distribution of fatty acids in the tea (*Camellia sinensis* (L.)) leaves.** *Food Chemistry* 37(1): 1990: 27-35

The order of occurrence of fatty acids (FA) in the leaves and stem of tea shoots is linolenic acid linoleic acid palmitic acid stearic acid oleic acid palmitoleic acid, irrespective of plucking standard or portion of the shoot. The stem had the least FA levels. Linolenic acid dominated the FA and increased with maturity of the leaf and coarser plucking standard. Similarly total FA, total unsaturated FA amd linolenic + linoleic acids increased with coarse plucking standard and maturity of leaf. This explains quality deterioration due to the higher amount of the group I volatile flavour compounds arising from the coarse plucking standard. AS

1218
Joubert (E). **Effect of batch extraction conditions on extraction of polyphenols from rooibos tea (*Aspalathus linearis*).** *International Journal of Food Science and Technology* 25(3): 1990: 339-343

The effects of extraction temp. (23, 50, 60, 70, 80 and 90 C) mass ratio of extract: dry tea leaf (5:1 and 10:1) and flow rate of water (0.1 and 0.2m ^{3}/h) on extraction of total polyphenol, flavonoids and non-flavonoid phenols from rooibos tea were determined with a single-stage batch-extraction system. Extraction of the different phenolic groups from tea leaf increased significantly with increase in temp. The increase in total polyphenol extraction was due mainly to increasing extraction of flavonoids. Increase in mass ratio and decrease in flow rate resulted in better extraction of the different phenolic groups. The phenolic content of extract

soluble solids also increased significantly with temp. At extraction temp. 23 and 50 C, increasing mass ratio resulted in a significant increase in total polyphenol and flavonoids content of the soluble solids. The non-flavonoids phenol content increased significantly with increasing mass ratio at temp. above 23 C. Flow rate did not significantly affect the total phenolic and flavonoid content of the soluble solids. AS

1219

Joubert (E). **Chemical and sensory analysis of spray- and freeze-dried extracts of rooibos tea (*Aspalathus linearis*).** *International Journal of Food Science and Technology* 25(3): 1990: 344-349

Spray- and freeze-dried rooibos tea extracts were prepared, and soluble solids which precipitated upon cooling of the conc. were isolated. Their effect on comp. and sensory qualities of the dried tea was determined. Preparation of soluble rooibos teas resulted in significant flavour differences but no preference for freshly brewed tea was found. The method of dehydration and removal of precipitated solids did not affect the flavour of the dried tea extract significantly. Removal of the precipitate resulted in marked decreases in total polyphenol, flavonoid, tannin, flavonol and proanthocyanidin content of the dried soluble product. AS

FATS AND OILS

1220

Thompson (AE), Dierig (DA), Knapp (SJ) and Kleiman (R). **Variation in fatty acid content and seed weight in some lauric acid rich *Cuphea* species.** *Journal of the American Oil Chemist's Society* 67(10): 1990: 611-617

The extent of variability in fatty acid content and seed wt. both within and among all available accessions of the three self pollinating species of *Cuphea* was studied. Species of *Cuphea* have emerged as promising sources for providing new domestic sources of medium-chain fatty acids. AS

1221

Schwartz (DP) and Rady (AH). **Determination and occurrence of oxofatty acids in fats and oils.** *Journal of the American Oil Chemist's Society* 67(10): 1990: 635-641

A relatively simple method is detailed for the routine isolation and estimation of oxofatty acids (OFA) in lipids. The lipid in cyclohexane is transmethylated in a two-phase, 3.5 min procedure, and the carbonyls in the methyl ester fraction are derivatized with 2,4-dinitrophenylhydrazine (DNPH) in the presence of monochloroacetic acid (MCA). The derivatives are fractionated on alumina, and the OFA fraction is obtained and evaluated spectrophotometrically. A large var. of animal, plant and marine lipids contained OFA ranging from to 50 μmoles/g. Data also show that (a) OFA are formed in naturally oxidizing fats and oils, and (b) strongly acidic conditions can cause elaboration of OFA in hydroperoxidized fats and oils. AS

1222

Servat (F), Montet (D), Pina (M), Galzy (P), Arnaud (A), Ledon. H., Marcou (L), Graille (J). **Synthesis of fatty hydroxamic acids catalyzed by the lipase of *Mucor miehei*.** *Journal of the American Oil Chemist's Society* 67(10): 1990: 646-649

1223

Decker (EA) and Faraji (H). **Inhibition of lipid oxidation by carnosine.** *Journal of the American Oil Chemist's Society* 67(10): 1990: 650-652

The antioxidant activity of carnosine, a β-alanine-histidine dipeptide found in skeletal muscle, was investigated. Carnosine (25 mM) inhibited the catalysis of lipid oxidation by iron, hemoglobin, lipoxidase and singlet oxygen from 35 - 96% suggesting that the antioxidant mechanism of carnosine is not solely due to metal chelation. Heating the carnosine at 100 C for 15 min had no effect on its ability to inhibit these lipid oxidation catalysts, and the activity of carnosine was not affected over the pH range of 5.1 - 7.1. Studies using tocopherol-containing liposomes suggest that carnosine and tocopherol do not act synergistically to inhibit lipid oxidation. These data indicate that carnosine has excellent potential for use as natural antioxidant in processed foods. AS

Fats

1224

Summerkamp (B) and Hesser (M). **Fat substitutes update.** *Food Technology* 44(3): 1990: 92-97

Protein-based substitutes, synthetic compounds, carbohydrate-replacements (gums, polydextrose, corn starch, maltodextrins, tapioca dextrins, potato starch maltodextrin and modified potato starch), combination products and market research report are briefly covered. SRA

Lipids

1225

Matthews (DM) and Kennedy (JP). **Structured lipids.** *Food Technology* 44(6): 1990: 127

Oils

1226

Mallet (JF), Gaydou (EM) and Archavlis (A). **Determination of petroselinic acid in Umbelliflorae seed oils by combined GC and 13** C NMR spectroscopy analysis. *Journal of the American Oil Chemist's Society* 67(10): 1990: 607-610

1227

Taylor (DR) and Jenkins (DB). **Factors affecting the pyrophorisity of spent bleaching clay.** *Journal of the American Oil Chemist's Society* 67(10): 1990: 678-685

Artificial cakes of bleaching clay/vegetable oil have been studied for their pyrophoric character using both Differential Scanning Calorimetry and a constant-temp., fixed-interval, spontaneous heating (CaTFISH) test developed in this lab. It was determined that this is a two-step process involving a first-stage low-temp. spontaneous heating reaction followed by a second-stage high-temp. spontaneous heating reaction. The latter is characterised by charring and, in some cases, flaming combustion. A study of relevant variables has established that clay type, filter cake age, oil retention, moisture, and the presence of antioxidant significantly affect the spontaneous heating characteristics of clay/oil masses. Oil type was not found to be a significant variable in these studies. AS

Palm oils

1228

Mohankumar (C), Arumughan (C) and Kaleysa Raj (R). **Histological localization of oil palm fruit lipase.** *Journal of the American Oil Chemist's Society* 67(10): 1990: 665-669

Rapeseed oils

1229

Hawrysh (ZJ), McMullen (LM), Lin (C), Tokarska (B) and Hardin (RT). **Effects of tertiary butylhydroquinone on canola oil thermal stability.** *Canadian Institute of Food Science and Technology Journal* 23(2/3): 1990: 94-100

The sensory (odour and flavour) and physico-chemical characteristics of tertiary butylhydroquinone (TBHQ) treated and butylated hydroxyanisole/toluene (BHA/BHT) treated canola oils subjected to common home heating procedures - shallow pan heating (up to 12 min at 185 C) and deep fat heating (up to 60 min at 185 C) were determined. Sensory data for both heating exp. indicated that neither TBHQ nor BHA/BHT enhanced the heat stability of canola oils. Physico-chemical data show that both antioxidant treatments had small but statistically significant (P greater than or equal to 0.05) effects in retarding thermal degradation in canola oils. AS

Soybean oils

1230

Huskey (LL), Snyder (HE) and Gbur (EE). **Analysis of single soybean seeds for oil and protein.** *Journal of the American Oil Chemist's Society* 67(10): 1990: 686-688

Sunflower oils

1231

Lajara (JR), Diaz (U) and Quidiello (RD). **Definite influence of location and climatic conditions on the fatty acid composition of sunflower seed oils.** *Journal of the American Oil Chemist's Society* 67(10): 1990: 618-623

SPICES AND CONDIMENTS

Ginger

1232

Kandiah (M) and Spiro (M). **Extraction of ginger rhizome:.Kinetic studies with supercritical carbon dioxide.** *International Journal of Food Science and Technology* 25(3): 1990: 328-338

The rates of extraction of [6]-gingerol from ground dried Jamaican ginger rhizomes were determined in supercritical carbon dioxide over the pressure range 128 - 197 bar (1850-2850 psi) and the temp. range 50 - 65 C. The carbon dioxide densities varied from 0.415 to 0.775g cm $^{-3}$. First order plots showed 2 approx. linear section with an initial intercept. The first linear section corresponded to a relatively fast initial extraction stage while the last 20% or so of the gingerol was extracted in the much slower subsequent stage. Reducing the ginger particle size by a factor of 3 increased the rate constant of the fast stage 9 fold. Despite the low viscosity of the supercritical fluid the rate constant of the fast stage were much smaller than in extractions with organic solvents. Only when the carbon dioxide density increased to 0.775g cm $^{-3}$ did the rate constant of the fast stage rise to a value comparable with but still smaller than, those in organic solvents of similar density. The rate constants of the later slow extraction stage were also some what smaller than

the corresponding values in organic slovents at 30 C. AS

1233

Wu (P), Kuo (M-C) and Ho (C-T). **Glycosidically bound aroma compounds in ginger (*Zingiber officinale* Roscoe).** *Journal of Agricultural and Food Chemistry* 38(7): 1990: 1553-1555

Free and glycosidically bound aromas from ginger juice were isolated and separated by an Amberlite XAD-2 column. Aroma compounds from a bound fraction were released by almond β-glucosidase hydrolysis. By use of octanol as the internal standard, volatile components of free and bound fractions were analysed by GC and GC-MS. Glycosidically bound aliphatic alcohols, monoterpene alcohols, acids, and aldehydes were reported in ginger for the first time. AS

SENSORY EVALUATION

1234

Bertuccioli (M), Belicchi (C), Bonelli (D), Chicchini (D), Cementi (S), Cruciani (G), Giulietti (G). **Food optimization with chemometrics.** *Industrie Alimentari* 28(276): 1989: 1049-1058, 1063 (It)

The paper reviews the chemometric strategies of interest for the food industry giving theory and examples on the collection of analytical and sensory data and the establishment of statistical models for food quality. AS

FOOD STORAGE

Nil

INFESTATION CONTROL AND PESTICIDES

Fungicides

1235

Singh (H), Shukla (KN), Dwivedi (R) and Yadav (LDS). **Cycloaddition of 4-amino-3-mercapto-1,2,4-triazole to heterocumulenes and antifungal activity of the resulting 1,2,4-triazolo(3,4-c)-1,2-dithia-4,5-diazines.** *Journal of Agricultural and Food Chemistry* 38(7): 1990: 1483-1486

BIOCHEMISTRY AND NUTRITION

1236

Berner (LA), McBean (CD) and Lofgren (PA). **Calcium and chronic disease prevention:.(Challenges to the food industry).** *Food Technology* 44(3): 1990: 50, 57-70

This article reviews the current state of the database linking Ca to chronic disease prevention. Aspects covered are: Ca consumption vs requirement and reccommended dietary allowances (RDAs), recent research and current thinking on some new and persistent questions about Ca intake and health issues, Ca bioavailability (effect of form of Ca, effect of food vs pills, effect of food sources and components and effect of meals), Ca and bone health (population studies, clinical trials and other consideration), Ca and blood pressure regulation (cross sectional studies, clinical trials, subpopulations interest, salt-sensitive individual and pregnant women) and Ca and colon cancer risk (epidemiological evidence, animal research and hypothesis, biomakers of colon cancer risk in humans) and recommendations. 138 references. SRA

1237

Weaver (CM). **Nutritionst's in the food industry - 50 years of curricula and opportunities for graduates. .** *Food Technology* 44(3): 1990: 82-85

1238

Murthi (TN), Jacob (G) and Devdhara (VD). **Determination of vitamin A in infant milk powders by high pressure liquid chromatography using fluorescence detector.** *Indian Journal of Dairy Science* 42(2): 1989: 330-331

1239

Marfo (EK), Simpson (BK), Idowu (JS) and Oke (OL). **Effect of local food processing on phytate levels in cassava, cocoyam, yam, maize, sorghum, rice, cowpea and soybean.** *Journal of Agricultural and Food Chemistry* 38(7): 1990: 1580-1585

Phytate levels in the unprocessed foods were 6.24 plus or minus 0.22 mg of phytate/g of sample (cassava), 8.55 plus or minus 0.46 mg/g (cocoyam), 6.37 plus or minus 0.32 mg/g (yam), 7.34 plus or minus 0.31 mg/g (white maize), 6.86 plus or 0.12 mg/g (yellow maize), 8.86 plus or minus 0.20 mg/g (red sorghum), 4.49 plus or minus 0.22 mg/g (rice), 8.24 plus or minus 0.22 mg/g (cowpea), and 6.88 plus or minus 0.52 mg/g (soybean). Seventy-two hours of fermentation substantially reduced phytate levels in these foodstuffs, ranging from 80% to 98%

for rice, cassava, and cocoyam, and from 52% to 65% for sorghum, maize, soybean, cowpea, and yam. Lowering of phytate levels was most rapid within the first 48 h of fermentation. Cooking had little reducing effect on phytate levels in whole cereals and legumes but had considerable reducing effect on phytate levels in the tubers. Further processing of all the intermediate products to ready-to-serve foods achieved reductions in phytate levels. The pH of the maize dough fell from pH 6.21 to pH 3.10 during fermentation. AS

1240

Ramaswamy (H), Ghazala (S) and Van de Voort (F). **Degradation kinetics of thiamine in aqueous systems at high temperatures.** *Canadian Institute of Food Science and Technology Journal* 23(2/3): 1990: 125-130

High temp. thermal destruction kinetics of thiamine (B1) were studied in water and in aqueous mixture of thiamine, ascorbic acid and Maillard colour forming compounds glucose and glycine. The thiamine content of test samples sealed in glass ampoules and capillary tubes subjected to various time-temp. treatments was analysed by HPLC. The study indicated that the two sample heating technique (ampoule and capillary) were comparable; the destruction of thiamine could be described by first order reaction kinetics, and the destruction behavior was dependent on the presence of other compounds (ascorbic acid and colour precursors). The activation energy and reference rate constant (k_0) at 121.1 C for thiamine destruction using the Arrhenius approach ranged from 103 - 118 kJ/mole and 0.0060 - 0.0067 min^{-1} in water, and 71.1 - 73.4kJ/mole and 0.0066 - 0.0069 min^{-1} in the mixture, resp. Similar analysis using the TDT approach yielded z and D_0 values of 26.4 - 30.6 C^0 and 350 - 394 min in water and 42.4 and 43.8 C^0 and 338 - 354 min in the mixture resp. AS

Nutrition

1241

Veena Kumar, Salil Sehgal and Yashpal Kaur. **Assessment of nutrition knowledge, attitudes and practices of mothers.** *Indian Journal of Nutrition and Dietetics* 26(6): 1989: 156-160

The nutrition knowledge and attitudes and practices of 160 mothers in Hissar has been studied using a pretested questionnarie. Half of the respondents (48.7%) were adequately informed about nutrition and 26.2% inadequately informed. They were well informed about the interrelationship of maternal nutritional status and parity, ideal age for starting supplementation in children and food preparation methods. 65% of mothers showed favourable attitude towards nutrition; 74% mothers showed good nutrition practices. GSR

1242

Penttila (P-L), Rasanen (L) and Kimppa (S). **Nitrate, nitrite, and N-nitroso compounds in Finnish foods and the estimation of the dietary intakes.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 190(4): 1990: 336-340

TOXICOLOGY

1243

Capar (SG). **Survey of lead and cadmium in adult canned foods eaten by young children.** *Journal of the Association of Official Analytical Chemists* 73(3): 1990: 357-364

A US Food and Drug Administration survey of Pb and Cd in 10 adult canned foods commonly eaten by children less than 5 yr old was conducted between Oct 1981 and Sept. 1985. The survey, which included foods preserved by a commercial canning process and packaged in metal containers, found the highest mean levels of Pb (0.32 µg/g) in tuna and of Cd (0.02 µg/g) in tuna and tomatoes. Pb levels in foods packaged in lead-soldered cans were about 5 times as high as those in food packaged in non lead-soldered cans. Mean Pb levels appeared to decline over the four years of the study. Cd levels were usually below the data reporting limit (0.01 µg/g). AS

FOOD LAWS AND REGULATIONS

Nil

Acceptability
milk/curd, containers & acceptability trials of stored 1121
Acetes
bisulphite treated acetes 1193
Acorus calamus
Sitophilus oryzae/Tribolium castaneum, Acorus calamus insecticidal activity against milled rice infested 1026
Additives
Kamaboko gels, additives & texture/protein solubility of 1201
food, additives use in 1017
Aflatoxins
dairy products, aflatoxin M1 residues in 1115
Ageing
bread, ageing & water soluble component changes in 1107
Agriculture
consultative group on international agricultural research 988
food commodities substitution & agricultural trade policies 987
Aldehydes
meat lipids, heating & aldehydes changes in 1167
Alkylresorcinols
cereals, alkylresorcinols in 1022
Alpha-amylases
breadmaking, alpha-amylases supplementation in 1107
Amino acids
cowpea protein conc., isoelectric point precipitation & amino acid comp. of 1062
dry beans, amino acid in 1058
seal meat, amino acid in 1186
Anisakis
salmon, Anisakis in cold smoked 1198
Antimicrobials
chitosans, hydrostatic pressure & antimicrobial effect of water-soluble 1018
Antioxidants
pork lion chops, antioxidants & visual/palatability attributes of hot/cold processed 1178
Antistaling agents
antistaling enzyme for baked goods 1106
Apple juices
processing/storage & phenolic comp. of apple juices 1214
Apples
cvs of Himachal Pradesh, ring drying behaviour in apple 1097
polyphenoloxidase in apples 1098
primary metabolites & organic acid metabolism in apples 1099
Aroma
mangoes, lactones/ 2,5-dimethyl-4-hydroxy-3-(2H)- -furanone & aroma of 1102
Aroma compounds
ginger, glycosidically bound aroma compounds in 1233
Asarone
spirits, asarone in 1005
Ascorbic acid
soybean trypsin inhibitors, ascorbic acid + Cu & inactivation of 1068
Aseptic packaging
quality control of aseptic packages 994
Aspergillus alutaceus
cereal/oilseed substrates & growth/toxin production in Asp. alutaceus 1012
Aspergillus niger
1,2,4-triazolo(3, 4-C)-1,2-dithia-4,5-diazines antifungal activity against Asp. niger 1235
Bacteria
cow milk, aerobic sporeforming bacteria in heat treated 1127
fish, spoilage bacteria & hydrogen sulphide/volatile sulphides production in 1188
milk, aerobic sporeforming bacteria heat resistance in 1126
sardines, bacteria & chilled sea water stored Indian oil 1199
Badi
soybean badi, low-cost technology for making 1069
Bakery products
antistaling enzyme for baked goods 1106
Baking quality
composite flour, baking potential of wheat/plantain 1032
Bambara groundnuts
corn-bambara groundnuts, nutritional quality of 1041
Bananas
pulp colour, measurement of banana 1100
Beauveria bassiana
beta-galactosidase production in Beauveria bassiana liquid culture 1013
Beef
bulls/steers meat, pH & tenderness of 1172
Beer
immobilized yeast reactor & fermentation/maturation of beer 1208
Beet sugar
preparations, proteins isolation from beet sugar 1076
Bengal gram
lipooxygenase 1056
Benzylpenicillin
milk, benzylpenicillin residues capillary GC detn in 1125
Berry fruit juices
sucrose enzyme induced loss in berry fruit juices 1213
Beta-carotenes
photodegradation of beta-carotenes 1003
Beverages
fermented beverages, stabilizers & whey separation in 1137
Biochemical properties
Cheddar cheese, starter culture & biochemical properties of 1143
Biotechnology
dairy industry, biotechnological applications in 1113
regulations 1015
Bisulphites
acetes, bisulphite treated 1193
Black gram
soaking & milling quality of black gram 1057
Blanching
potato during blanching, starch gelatinization temp. in 1083
Bleaching clay
spent bleaching clay, pyrophorisity of 1227
Bologna
chopping methods & characteristics of bologna 1182
Bovines
muscles, metmyoglobin reductase activity in bovine 1174
Bread
ageing & water soluble component changes in bread 1107

wheat bread doughs, fermentation & nitrogen compounds biochemical evaluation in 1108
Breadmaking
glycerolysed oils/alpha-amylases supplementation in breadmaking 1107
Brewing
high gravity brewing, brewer's yeast glucosidase in 1207
pesticides & brewing materials 1209
Brewing industry
precision flow measurement in brewing industry 1210
Broad beans
legumin, liquid/liquid phase equilibrium in broad bean 1039
Browning
fruits, colorimetric evaluation of enzymatic browning of 1096
Buffalo milk
Cheddar cheese, starter culture & sensory/biochemical properties of 1143
Buffalo milk concentrate
caseins electrophoretic mobility/chromatographic patterns of stored buffalo milk conc. 1164
Bulking agent
isomalt-reduced calorie bulking agent 1021
Burfi
pathogenic staphylococci in burfi 1122
Butter
nutritional value of butter 1132
pathogenic staphylococci in butter 1122
Buttermilk
fermented beverages, stabilizers & whey separation in sweet cream butter milk based 1137
nutritional value of buttermilk 1132
yoghurt-like product manufacture from skim milk/soybean/buttermilk 1117
Buttermilk powder
phospholipids in buttermilk powder 1155
Butylated hydroxy anisole
ghee, heating & BHA stability in 1147
Butylated hydroxy toulene
ghee, heating & BHT stability in 1147
Cabbages
natural red colour from red cabbage 1078
Cadmium
canned foods, Cd in adult 1243
Calcium
chronic disease prevention & calcium 1236
Calcium caseinates
chem./reconstitution properties of fresh/sour buffalo milk based edible calcium caseinates 1162
Canned foods
Pb/Cd in adult canned foods 1243
Canning
dry beans, canning & comp. of 1059
Carbohydrates
maltose, carbohydrate reactive extrusion & production of 1104
Carbon dioxide
ginger, supercritical carbon dioxide extraction of 1232
tomatoes, cold storage & carbon dioxide diffusion in 1090
Carcasses
sheep meat, preslaughter transport & carcass yield of 1176
Carnosine
lipid oxidation, carnosine inhibition of 1223
Carotenoids
light sensitivity of carotenoids 1003
potatoes, storage temp./irradiation & carotenoid disappearance in 1080
Carthamin
aqueous solutions, carthamin decomposition in 1002
Caseins
buffalo milk conc., caseins electrophoretic mobility/chromatographic patterns of stored 1164
buffalo milk conc., caseins electrophoretic/chromatographic patterns in 1163
chem./reconstitution properties of fresh/sour buffalo milk based edible sodium/calcium caseinates 1162
Cassava
processing & phytate levels in cassava 1239
Catfish
temp. & storage characteristics of catfish 1194
Cereal products
beta-glucan enzymic detn. in cereal-based food products 1023
Cereals
Asp. alutaceus/Penicillium verrucosum, cereal substances & growth/toxin production in 1012
alkylresorcinols in cereals 1022
dried fish-cereal mixture 1187
Chapaties
Indian wheats & chapati making quality, review 1028
preservation/discoloration of chapaties 1028
Cheddar cheese
Lactobacillus & heterofermentative bacteria control during Cheddar cheese maturation 1145
flavour isolation techniques for Cheddar cheese 1144
immobilized proteases & preparation of Cheddar cheese 1142
peptide production in accelerated-ripened cheddar cheese 1141
starter culture & sensory/biochemical properties of milk based Cheddar cheese 1143
Cheese
goat's cheese, freezing/frozen storage & physico-chem./sensory characterisitcs of 1140
manufacture, protease immobilization for cheese 1139
quality of marketed processed cheese 1138
Chemical composition
oilseeds, chem. comp. of newer 1063
Chemicophysical properties
UHT buffalo milk, sensory properties & physico-chem. properties of 1130
Chemometrics
food optimization with chemometrics 1234
Chickens
patties, quality of chicken 1169
Children
leaf protein conc. supplementation & haemoglobin level in children 1086
Chitosans
hydrostatic pressure & antimicrobial effect of water-soluble chitosans 1018
Chopping
bologna, chopping methods & characteristics of 1182
Chromatography
buffalo milk conc., caseins chromatographic patterns of stored 1164

Chromium
fish, Cr in Kali estuary 1189
Chymosin
Kluyveromyces lactis, chymosin evaluation from genetically engineered 1008
dairy products, chymosin ELISA detection in 1118
Chymotrypsin inhibitors
red kidney beans, trypsin/chymotrypsin inhibitors purification/partial characterization from 1061
Citrus juices
5-methyltetrahydrofolate reversed-phase HPLC detn. in citrus juices 1215
Clostridium sporogenes
spores, radiation-induced heat-sensitivity in Cl. sporogenes 1010
Cocoyam
processing & phytate levels in cocoyam 1239
Coffee
raw coffee, water spectroscopic analysis in 1211
Collagen
meat collagen conditioning effect on 1173
Colorimetry
fruits, colorimetric evaluation of enzymatic browning of 1096
Colour
banana pulp colour, measurement of 1100
microalgae containing food products, colour reduction in 1009
seal meat, colour characteristics of 1186
Colourants
red cabbage, natural red colour from 1078
Common beans
growing location/hardening & hard-to-cook phenomenon in common beans 1055
Composite flours
wheat/plantain composite flour, rheology/baking potential of 1032
Concentrates
rice bran protein conc., moisture & storage stability of 1027
Concentration
fruit juices, membrane technology & concn. of 1212
Containers
milk/curd, containers & acceptability trials of stored 1121
Cookies
rice bran-soy blend supplementation in cookies 1110
Cooking
pasta, cooking quality of 1112
Copper
fish, Cu in Kali estuary 1189
soybean trypsin inhibitors, ascorbic acid + Cu inactivation of 1068
Corn
corn-wheat based pasta making process optimisation 1046
kernels, sitostanyl ferulate & mechanical damage to corn 1045
legumes-corn blends, nutritional quality of 1041
moisture content & quality of corn 1044
processing & phytate levels in corn 1239
sugar snap cookies, corn fiber incorporation into 1109
surface oil application & physico-chemical/dry-milling properties of corn 1042
Corn meals
twin-screw extrusion & starch fragmentation/protein insolubilization in corn meals 1048
Corn products
starch hydrolysis in extruded corn/soybean products 1040
Corn starch
concn./temp./starch hydrolysates & network properties of corn starch 1047
electron spin resonance & lipid binding of modified corn starch 1043
Cottonseed proteins
7S storage protein isolation/purification from cottonseed 1064
Coumarin
spirits, coumarin in 1005
Cowpea protein concentrate
isoelectric point precipitation & proximate/amino acid comp. of cowpea protein conc. 1062
Cowpeas
corn-cowpea blends, nutritional quality of 1041
processing & phytate levels in cowpea 1239
weaning food formulations, sorghum/cowpea based 1052
Crabs
meat, analysis of boiled crab 1184
Crispness
snacks, equilibrium moisture content/BET monolayer moisture & crispness of extruded rice-legume 1025
Croakers
fingers, preparation of croaker 1205
Cuphea
fatty acid content/seed wt. variation in Cuphea sp. 1220
Curds
containers & acceptability trials of stored curds 1121
Curing
nitrite-free meat-curing system 1165
Cyclopiazonic acid
Penicillium griseofulvum, preservatives & cyclopiazonic acid production by 1019
DNA
meats, DNA hybridization assay & species identification in cooked 1170
Dahi
nutritional value of dahi 1132
pathogenic staphylococci in dahi 1122
Dairy industry
Indian dairy industries, R and D in 1114
Indian dairy industries, dairy products mix of 1134
biotechnological applications in dairy industry 1113
Dairy products
Indian dairy industries, dairy products mix of 1134
aflatoxin M1/sulphamethazine residues in dairy products 1115
chymosin ELISA detection in dairy products 1118
line heat source method & thermal conductivity of dairy products 1116
manufacture, milk fat/milk solid losses during fat-rich dairy products 1119
De-esterification
pectin, kinetics of acid-catalysed de-esterification of 998
Deamidation
food proteins, deamidation of selected 999
Development
dairy industries, R and D in Indian 1114

product development 989
Dietary fibers
fruits/vegetables, dietary fiber comp. of Malaysian common 1084
Diets
milk, human diet in 1120
Differential scanning colorimetry
starch, DSC studies on heat-treated/enzyme resistant 1105
starch/sugar water, DSC & interactions of 1049
2,5-dimethyl-4-hydroxy-3-(2H)--furanone
mangoes, 2,5-dimethyl-4-hydroxy-3-(2H)--furanone & aroma of 1102
Diseases
calcium & chronic disease prevention 1236
Domiati cheese
L. helveticus cell-free extract & acceleration of Domiati cheese ripening 1146
Dough
scanning electron microscopy & formation of dough 1111
Dried foods
egg white, gel formation properties detn. in dried 1183
fish-cereal mixture, dried 1187
mutton, preparation/storage stability of dried salted 1175
tea extracts, chem./sensory analysis of spray-/freeze-dried 1219
Dry beans
comp. of dry beans 1058
soaking/canning & comp. of dry beans 1059
Drying
apple cvs of Himachal Pradesh, ring drying behaviour in 1097
fish drying, solar dryer for coastal belt 1192
pineapples, osmotic dehydration of 1103
ELISA
dairy products, chymosin ELISA detection in 1118
Egg whites
dried egg white, gel formation properties detn. in 1183
Electron spin resonance
starch/sugar water, ESR & interactions of 1049
Electrophoresis
buffalo milk conc., caseins electrophoretic mobility patterns of stored 1164
Element
vegetable foodstuffs, multielement X-ray fluorescence detn. in 1085
Emulsion
Staphylococcus aureus in emulsion 1123
Enzymes
berry fruit juices, sucrose enzyme induced loss in 1213
faba beans, presoaking & enzyme inhibitors 1060
quinoa, enzyme activities in 1089
starch, DSC studies on enzyme resistant 1105
Equipments
milk products manufacture, equipment for 1133
Extraction
ginger, supercritical carbon dioxide extraction of 1232
tea, batch extraction conditions & polyphenols extraction from rooibos 1218
Extractors
food processing, countercurrent extractor for 997
Extruded foods
starch hydrolysis in extruded corn/soybean products 1040
Extrusion
corn meals, twin-screw extrusion & starch fragmentation/protein insolubilization in 1048
maltose, carbohydrate reactive extrusion & production of 1104
Faba beans
presoaking & enzyme inhibitors/ polyphenols in faba beans 1060
Fats
oxofatty acids in fats 1221
substitute 1224
Fats milk
Staphylococcus aureus in milk fat 1123
UHT milk, storage & fat content in 1129
dairy products manufacture, milk fat losses during 1119
Fats vegetable
Staphylococcus aureus in vegetable fat 1123
Fatty acids
Cuphea sp. fatty acid content in 1220
Rhodotorula gracelis lipids, fatty acid comp. of 1014
UHT milk, storage & volatile fatty acids in UHT milk 1128
fats/oils, oxofatty acids in 1221
meat, heating & fatty acid comp. changes in 1167
sunflower seed oils, location/ climatic conditions & fatty acid comp. of 1231
tea leaves, plucking & fatty acid distribution in 1217
Fatty hydroxamic acid
Mucor miehei, lipase & fatty hydroxamic acid synthesis in 1222
Fenbendazole
milk, fenbendazole detn. in 1124
Fermentation
beer, immobilized yeast reactor & fermentation of 1208
bread doughs, fermentation & nitrogen compounds biochemical evaluation in wheat 1108
pearl millets, fermentation & minerals HCl extractability from 1050
Fermented foods
beverages, stabilizers & whey separation 1137
sausages 1181
Film
GC/sensory evaluation of packaging film 993
modified atm. packaging & oxygen-barrier shrink film 992
Fish
dried fish-cereal mixture 1187
industrial fishery system development strategies in developing countries 1191
meat powder/meal, nutritional value of fatty deep sea fish edible 1190
metals in Kali estuary fish 1189
solar dryer for coastal belt fish drying 1192
spoilage bacteria & hydrogen sulphides/volatile sulphides production in fish 1188
Fish fingers
preparation of fish fingers 1205
Fish powder
fish edible meat powder, nutritional value of fatty deep sea 1190
Flavour
Cheddar cheese, flavour isolation techniques for 1144
UHT milk, storage & flavour characteristics in 1128
crab meat flavour, analysis of 1184
Flavour compounds
potatoes, 3-(methylthio) alkanols in French fried 1079

stereo-isomeric flavour compounds 1004
Freezing
cheese, freezing & physico-chem./sensory characteristics of goat's 1140
Fried foods
potatoes, 3-(methylthio) alkanols in French fried 1079
Frog legs
frozen frog legs, gamma-irradiation & Salmonella serotypes isolated from 1185
Frozen foods
frog legs, gamma-irradiation & Salmonella serotypes isolated from frozen 1185
lamb chops/steaks, frozen display life of 1177
Fruit juices
membrane technology & osmosis/concn. of fruit juices 1212
Fruits
colorimetric evaluation of enzymatic browning of fruits 1096
dietary fiber comp. of Malaysian common fruits 1084
heat & water sorption in dried fruits 1094
quality of fruits 1092
snacks, formulation/processing of fruit 1093
Fungi
yoghurts, humectants/water activity & mould growth in cold stored 1161
Fungicides
1,2,4-triazolo(3,4-C)-1,2-dithia--4,5-diazines antifungal activity against fungi 1235
Fusarium oxysporum
1,2,4-triazolo(3,4-C)-1,2-dithia--4,5-diazines antifungal activity against Fusarium oxysporum 1235
Galactosidases
Beauveria bassiana liquid cultures, beta-galactosidases production in 1013
Gas chromatography
films, GC evaluation of packaging 993
milk, benzylpenicillin/beta-lactam residues capillary GC detn. in 1125
oils, petroselinic acid GC detn. in Umbelliflorae seed 1226
onion var. comparison by head space GC-MS 1075
Gelatinization
starch gelatinization temp. in potato during blanching 1083
Gelation
sardine proteins, gelation of 1201
Gels
Kamaboko gels, thermal processing/additives & texture/protein solubility of 1201
egg white, gel formation detn. in dried 1183
properties of Kamaboko gels 1206
Germination
soybeans/Phaseolus, germination & chem. comp. of 1054
Ghee
heating & BHT/BHA stability in ghee 1147
nutritional value of ghee 1132
residues, shelf life/utilization of ghee 1148
Ginger
glycosidically bound aroma compounds in ginger 1233
supercritical carbon dioxide extraction of ginger 1232
Glucan
cereal-based food products, beta-glucan enzymic detn. in 1023
Glucosidase
brewing, brewer's yeast glucosidase high gravity 1207
Gluten
scanning electron microscopy & formation of gluten 1111
Glutenin
subunits, wheat low molecular wt. glutenin 1036
Glycerolysed oils
breadmaking, glycerolysed oils supplementation in 1107
Gnetum africanum
leaves, protein nutritive value in Gnetum africanum 1087
Grains
moisture content & angle of repose/bulk density of 1038
Grape juices
processing/storage & phenolic comp. of Thompson seedless grape juices 1216
Grapes
triglycerides & grape-ripening indices 1101
Guarana seeds
tannin fractions in guarana seeds 1006
Gulab jamun
manufacture, equipment for gulab jamun 1133
HPLC
citrus juices, 5-methyltetrahydrofolate reversed-phase HPLC detn. in 1215
Haemoglobin
leaf protein conc. supplementation & haemoglobin level in children 1086
Halibut
body asymmetry & nutritive value of Indian halibut 1195
Heat
cow milk, aerobic sporeforming bacteria in heat treated 1127
dried fruits, heat & water sorption in 1094
milk, aerobic sporeforming bacteria heat resistance in 1126
Heating
ghee, heating & BHT/BHA stability in 1147
meat lipids, heating & fatty acid comp./aldehydes changes in 1167
Histamines
linoleic acid, histamine stimulatory effect & peroxidation of 1000
Humectants
yoghurts, humectants & shelf life of cold stored 1161
Hydrogen sulphides
fish, spoilage bacteria & hydrogen sulphide production in 1188
5-hydroxythiabendazole
milk, 5-hydroxythiabendazole detn. in 1124
Ice cream
pathogenic staphylococci in ice cream 1122
potato pulps incorporation in ice cream 1149
Industries
developing countries, industrial fishery system development strategies in 1191
nutritionists in food industry 1237
Infant milk powders
vitamin A HPLC detn. in infant milk powders 1238
Intermediate moisture foods
wheat flour doughs, rheology of intermediate moisture whole 1034
Intermediate moisture fruit
fillings 1093
Intermediate moisture meat
preparation of intermediate moisture meat 1168
Irradiation
food irradiation 991

frog legs, gamma-irradiation & Salmonella serotypes isolated from frozen 1185
potatoes, irradiation & lipoxygenase activity/ carotenoid, disappearance in 1080
Isomalt
reduced-calorie bulking agent 1021
Kamaboko
gels, properties of Kamaboko 1206
gels, thermal processing/ additives & texture/protein solubility of Kamaboko 1201
Keeping quality
sardine fillets, smoking & keeping quality of vacuum packed 1200
Khoa
chem. quality of Calcutta market khoa 1151
manufacture, equipment for khoa 1133
milk, khoa preparation & vitamin biological activity in 1150
pathogenic staphylococci in khoa 1122
sensory/instrumental data & texture of khoa 1152
Kidney beans
red kidney beans, trypsin/ chymotrypsin inhibitors purification/partial characterization from 1061
Krills
utilization of Antarctic krill 1196
Kulfi
preparation/quality of kulfi 1153
Lactam
milk, beta-lactam residues capillary GC detn. in 1125
Lactobacillus
Cheddar cheese maturation, Lactobacillus & heterofermentative bacteria control during 1145
Lactones
mangoes, lactones & aroma of 1102
Lambs
chops/steaks, frozen display life of lamb 1177
Lead
canned foods, Pb in adult 1243
Leafy protein concentrate
haemoglobin level in children & supplementing leaf protein conc. 1086
Leafy vegetables
protein nutritive value in green leafy vegetables 1087
Legumes
snacks, equilibrium moisture content/BET monolayer & crispness of extruded rice-legume 1025
Legumin
broad bean/pea legumin, liquid/ liquid phase equilibrium in 1039
Leiognathus brevirostris
metals in Kali estuary L. brevirostris 1189
Linoleic acid
histamine stimulatory effect & peroxidation of linoleic acid 1000
Lipases
Mucor miehei, lipases & fatty hydroxamic acid synthesis in 1222
oil palm fruit lipases, histological localization of 1228
Lipids
Rhodotorula gracelis lipids, physicochemical characteristics/ fatty acid comp. of 1014
carnosine inhibition of lipid oxidation 1223
corn starch, electron spin resonance & lipid binding of modified 1043
dry beans, soaking/canning & lipids in 1059
meat lipids, heating & fatty acid comp./aldehydes changes in 1167
sardines, rancidity & lipid oxidation of dried-salted 1202
structured lipids 1225
Lipoxygenases
Bengal gram lipoxygenase 1056
potatoes, storage temp./ irradiation & lipoxygenase activity in 1080
soy flour, storage stability of polyethylene packed lipoxygenase-free full-fat 1070
Localization
oil palm fruit lipases, histological localization of 1228
Locust beans
African locust bean seed meals, protein quality of 1053
Lucerne
haemoglobin level in children & supplementing leucerne leaf protein conc. 1086
Lutein
photodegradation of lutein 1003
Lysinoalanine
rapeseed protein meal/isolate, lysinoalanine concn. in 1067
Maltose
carbohydrate reactive extrusion & production of maltose 1104
Manganese
fish, Mn in Kali estuary 1189
Mangoes
lactones/2, 5-dimethyl-4-hydroxy-3-(2H)- -furanone & aroma of mangoes 1102
Mass spectrometry
onion var. comparison by head space GC-MS 1075
Maturation
Cheddar cheese maturation, Lactobacillus & heterofermentative bacteria control during 1145
beer, immobilized yeast reactor & maturation of 1208
Meat
collagen, conditioning effect on meat 1173
cooked meats, DNA hybridization assay & species identification in 1170
nitrite-free meat-curing system 1165
preblends, water/salt content & protein solubility/water retention of meat 1171
Membrane technology
fruit juices, membrane technology & osmosis/concn. of 1212
Metabolism
apples, primary metabolites & organic acid metabolism in 1099
5-methyltetrahydrofolate
citrus juices, 5-methyltetrahydrofolate reversed-phase HPLC detn. in 1215
Microalgae
colour reduction in food products containing microalgae 1009
Microbial quality
Rasmalai, microbial quality of 1156
aseptic packages, microbial quality control of 994
potatoes, sulphur dioxide & microbial growth in refrigerated pre-peeled plastic film packed 1081
Microbiology
recombimant DNA techniques use in food 1007
Microwaving
foods, microwaving & spontaneous bumping/splattering fiberoptic pressure measurement in 996
Milk

LP-system & manufacture of milk 1136
aerobic sporeforming bacteria heat resistance in milk 1126
benzylpenicillin/beta-lactam residues capillary GC detn. in milk 1125
containers & acceptability trials of stored milk 1121
cow milk, aerobic sporeforming bacteria in heat treated 1127
human diets/nutrition in milk 1120
khoa preparation & vitamin biological activity in milk 1150
pathogenic staphylococci in milk 1122
quality of milk 1131
thiobendazole/5-hydroxythiabendazole/fenbendazole/oxfendazole detn. in milk 1124
Milk concentrate
buffalo milk conc., caseins electrophoretic/chromatographic patterns in 1163
Milk powder
detn. of milk powder particle size distribution 1154
infant milk powder, vitamin A HPLC detn. in 1238
Milk products
indigenous milk products, research/technology of Indian 1135
nutritional value of milk products 1132
pathogenic staphylococci in milk products 1122
Milkfish
muscle, protease purification/characterization from milk fish 1197
Milling
balck gram, soaking & milling quality of 1057
corn, surface oil application & dry-milling properties of 1042
Minerals
pearl millets, fermentation & minerals HCl extractability from 1050
Moisture
corn, moisture content & quality of 1044
food grains, moisture content & angle of repose/bulk density of 1038
Mucor miehei
lipase & fatty hydroxamic acid synthesis in Mucor miehei 1222
Mugil cephalus
metals in Kali estuary Mugil cephalus 1189
Muscles
bovine muscles, metmyoglobin reductase activity in 1174
fish muscle protease purification/characterization from 1197
tilapia muscle myofibrils, pepstatin-sensitive protease & changes in 1204
Mutton
patties, quality of mutton 1169
preparation/storage stability of dried salted mutton 1175
N-nitroso compounds
Finnish foods, N-nitroso compounds in 1242
Nitrates
Finnish foods, nitrates in 1242
Nitrites
Finnish foods, nitrites in 1242
meat-curing system, nitrite-free 1165
Nitrogen
bread doughs, fermentation & nitrogen compounds biochemical evaluation in wheat 1108
Nutrition
assessment of nutrition knowledge/attitudes/practice of mothers 1241
cereals, nutritional value & alkylresorcinols in 1022
food industry, nutritionists in 1237
milk, human diet/nutrition in 1120
Nutritional values
fish edible meat powder/meal, nutritional value of fatty deep sea 1190
halibut, body asymmetry & nutritive value of Indian 1195
leafy vegetables, protein nutritive value in green 1087
milk products, nutritional value of 1132
quinoa, nutritional value of quinoa 1088
Oil palm
fruit lipases, histological localization of oil palm 1228
Oils
Umbelliflorae seed oils, petroselinic acid GC/13C NMR spectroscopic detn. in 1226
oxofatty acids in oils 1221
Oilseeds
Asp. alutaceus/Penicillium verrucosum, oilseed substrates & growth/toxin production in 1012
chem. comp. of newer oilseeds 1063
Onions
var. comparison by head-space GC-MS 1075
Organic acids
apples, primary metabolites & organic acid metabolism in 1099
Osmosis
fruit juices, membrane technology & osmosis of 1212
pineapples, osmotic dehydration of 1103
Oxfendazole
milk, oxfendazole detn. in 1124
Oxidation
lipid oxidation, carnosine inhibition of 1223
Oxygen
UHT milk, storage & oxygen content in 1129
Packaging materials
sandesh, packaging materials suitability for packing 1157
Packaging modified atmosphere
oxygen-barrier shrink film & modified atm. packaging 992
Palatability
pork lion chops, antioxidants & palatability attributes of hot/cold processed 1178
Paneer
nutritional value of paneer 1132
Pasta
cooking quality of pasta 1112
Patties
quality of chicken/mutton patties 1169
Pearl millet proteins
polyphenols/phytates & protein quality of pearl millets 1051
Pearl millets
fermentation & minerals HCl extractability from pearl millets 1050
polyphenols/phytates & protein quality of pearl millets 1051
Peas
legumin, liquid/liquid phase equilibrium in pea 1039
Pectin
kinetics of acid-catalysed de-esterification of pectin 998
Pencillium griseofulvum
preservatives & cyclopiazonic acid production by Penicillium griseofulvum 1019

Penicillium verrucosum
cereal/oilseed substrates & growth/toxin production in P. verrucosum 1012
Peptides
cheddar cheese, peptide production in accelerated-ripened 1141
Pera
pathogenic staphylococci in pera 1122
Perches
fingers, preparation of perch 1205
Peroxidation
linoleic acid, histamine stimulatory effect & peroxidation of 1000
Pesticides
brewing materials & pesticides 1209
Petroselinic acid
oils, petroselinic acid GC/13C NMR spectroscopic detn. in Umbelliflorae seed 1226
Phaseolus
germination & chem. comp. of Phaseolus 1054
Phenolic acids
dry beans, phenolic acid in 1058
dry beans, soaking/canning & phenolic acids in 1059
Phenols
apple juices, processing/storage & phenolic comp. of 1214
grape juices, processing/storage & phenolic comp. of Thompson seedless 1216
Phospholipids
buttermilk powder, phospholipids in 1155
Phytates
pearl millets, phytates & protein quality of 1051
vegetables, processing & phytate levels in 1239
Phytic phosphorus
wheat/wheat products, phytic phosphorus in 1028
Pigeon peas
corn-pigeon pea blends, nutritional quality of 1041
Pineapples
osmotic dehydration of pineapples 1103
Polyacrylamide gel electrophoresis
wheats, PAGE & salt-soluble proteins of US soft 1037
Polyethylene
soy flour, storage stability of polyethylene packed lipoxygenase-free full-fat 1070
squash, polyethylene & quality of fruit 1095
Polyphenoloxidases
apples, polyphenoloxidase in 1098
Polyphenols
faba beans, presoaking & polyphenols in 1060
pearl millets, polyphenols & protein quality of 1051
tea, batch extraction conditions & polyphenols extraction from rooibos 1218
Polypropylene
squash, polypropylene & quality of fruit 1095
Pork
dietary vitamin E & stability of raw/cooked pork 1180
fat, headspace volatiles from heated pork 1179
lion chops, antioxidants & visual/palatability attributes of hot/cold processed pork 1178
Potato starch
blanching, starch gelatinization temp. in potato during 1083
Potatoes
3-(methylthio) alkanols in French fried potatoes 1079
ice cream incorporated by potato pulps 1149
irradiation/storage temp. & lipoxygenase activity/carotenoids disappearance in potatoes 1080
sulphur dioxide & microbial growth in refrigerated pre-peeled plastic film packed potatoes 1081
Preservation
chapati, preservation of, review 1028
Preservatives
Penicillium griseofulvum, preservatives & cyclopiazonic acid production by 1019
Proanthocyanidins
wheat bran, proanthocyanidins in 1033
Processes
food technological processes, reaction kinetics & analysis/control of 1001
Processing
apple juices, processing & phenolic comp. of 1214
food processing, countercurrent extractor for 997
grape juices, processing & phenolic comp. of Thompson seedless 1216
vegetables, processing & phytate levels in 1239
Products
development of products 989
Proteases
Cheddar cheese, immobilised proteases & preparation of 1142
cheese manufacture & protease immobilization 1139
tilapia muscle myofibrils, pepstatin-sensitive protease & changes in 1204
Proteins
Kamaboko gels, thermal processing/additives & protein solubility of 1201
beet sugar preparation, proteins isolation from 1076
cookies, rice bran-soy blend supplementation in 1110
corn meals, twin-screw extrusion & protein insolubilization in 1048
deamidation of selected food proteins 999
dry beans, proteins in 1058
dry beans, soaking/canning & proteins in 1059
leafy vegetables, protein nutritive value in green 1087
rice bran protein conc., moisture & storage stability of 1027
rice, protein disruption & viscoelastic properties of cooked 1024
sunflower meals, proteins of 1073
sunflower meals, salt soluble proteins of 1072
tamarind/African locust bean seed meals, protein quality of 1053
Proteins meat
meat preblends, water/salt content & protein solubility/water retention of 1171
Proteolysis
yoghurts, humectants & proteolysis in cold stored 1161
Pyrophorisity
spent bleaching clay, pyrophorisity of 1227
Quality
cheese, quality of marketed processed 1138
fruits/vegetables, quality of 1092
khoa, chem. quality of Calcutta market 1151

kulfi, quality of 1153
milk, quality of 1131
squash, polypropylene/polyethylene films & quality of 1095
Quassine
spirits, quassine in 1005
Quinine
spirits, quinine in 1005
Quinoa
comp./nutritional value/application of quinoa 1088
enzyme activities in quinoa 1089
Radiation
Clostridium sporogenes spores, radiation-induced heat-sensitivity in 1010
Rancidity
sardines, rancidity & lipid oxidation of dried-salted 1202
Rapeseed flour
preparation, detoxified high functional rapeseed flour 1066
Rapeseed meal
ultrafiltration rejection coeff. of rapeseed meal components 1065
Rapeseed oils
TBHQ & thermal stability in rapeseed oils 1229
Rapeseed proteins
meal/isolate, lysinoalanine concn. in rapeseed proteins 1067
Rasmalai
microbial quality of rasmalai 1156
Recombinant DNA
microbiology, recombinant DNA techniques use in food 1007
Regulations
biotechnology 1015
Research
dairy industries, R and D in Indian 1114
milk products, research/technology of Indian indigenous 1135
Residues
dairy products, aflatoxin M1/sulphamethazine residues in 1115
Rheological properties
Triticum dicoccum, rheological properties of 1029
composite flour, rheological properties of wheat/plantain 1032
wheat flour doughs, rheology of low/intermediate moisture whole 1034
Rhodotorula gracelis
lipids, physicochemical characteristics/fatty acid comp. of Rhodotorula gracelis 1014
Rice
Sitophilus oryzae/Tribolium castaneum, Acorus calamus insecticidal activity against milled rice infested 1026
processing & phytate levels in rice 1239
protein disruption & viscoelastic properties of cooked rice 1024
snacks, equilibrium moisture content/BET monolayer moisture & crispness of extruded rice-legume 1025
Rice bran
cookies, rice bran-soy blend supplementation in 1110
protein conc., moisture & storage stability of rice bran 1027
Ripening
cheese ripening, L. helveticus cell-free extract & acceleration of Domiati 1146
triglycerides & grape-ripening indices 1101
Rural
soybean badi, low-cost technology for making 1069
Saccharides
dry beans, sacccharide comp. of 1058
dry beans, soaking/canning & sacccharides in 1059
Salmon
Anisakis in cold smoked salmon 1198
Salmonella
food, Salmonella rapid test oxoid kit for 1011
frog legs, gamma-irradiation & Salmonella serotypes isolated from 1185
Salt
cheese ripening L. helveticus cell-free extract & acceleration of Domiati 1146
Sandesh
packaging materials suitability for packing sandesh 1157
Saponins
dry beans, saponins in 1058
dry beans, soaking/canning & saponins in 1059
Sardines
bacteria & chilled sea water stored Indian oil sardines 1199
proteins, gelation of sardine 1201
rancidity & lipid oxidation of dried-salted sardines 1202
smoking & keeping quality of vacuum-packed sardine fillets 1200
Sausages
fermented sausages 1181
Scanning electron microscopy
gluten/dough, scanning electron microscopy & formation of 1111
Sea water
sardines, bacteria & chilled sea water stored Indian oil 1199
Seal meat
chem. comp./amino acid/colour characteristics of seal meat 1186
Sedimentation
UHT milk, storage & sedimentation characteristics in 1129
Sensory evaluation
film, sensory evaluation of packaging 993
rooibos tea extracts, sensory analysis of spray-/freeze-dried 1219
Sensory properties
Cheddar cheese, starter culture & sensory properties of buffalo milk based 1143
UHT buffalo milk, sensory changes & physico-chem. properties of 1130
cheese, freezing/frozen storage & sensory properties of goat's 1140
conventional/cook-chill method & sensory quality of foods 1160
sardine fillets, smoking & sensory properties of 1200
Sheep
meat quality, preslaughter transport & carcass yield/indices of sheep 1176
Shelf life
ghee residues, shelf life of 1148
sunflower nutmeats, shelf life stability of hydrocolloid-coated confectionery 1074
yoghurts, humectants/water activity & shelf life of cold stored 1161
Shrikhand
manufacture, equipment for shrikhand 1133
Sillago sihama
metals in Kali estuary Sillago sihama 1189
Sitophilus oryzae
rice infested Sitophilus oryzae, Acorus calamus insecticidal activity against milled 1026
Sitostanyl ferulate

corn kernels, sitostanyl ferulate & mechanical damage to 1045 1045
Skim milk
yoghurt-like products manufacture from skim milk/soybean/buttermilk solids 1117
Skim milk powder
phospholipids in skim milk powder 1155
Snacks
formulation/processing of fruit snacks 1093
rice-legume snacks, equilibrium moisture content/BET monolayer moisture & crispness of extruded 1025
Snap cookies
sugar snap cookies, corn fiber incorporation into 1109
Soaking
black gram, soaking & milling quality of 1057
dry beans, soaking & comp. of 1059
faba beans, presoaking & enzyme inhibitors/polyphenols in 1060
Sodium caseinates
chem./reconstitution properties of fresh/sour buffalo milk based edible sodium caseinates 1162
Sodium chloride
sorbic acid stability & NaCl aqueous solution 1020
Solanum nigrum
leaves, protein nutritive value in S. nigrum 1087
Solar dryer
fish drying, solar dryer for coastal belt 1192
Sorbic acid
NaCl aqueous solution & stability of sorbic acid 1020
Sorghum
processing & phytate levels in sorghum 1239
weaning food formulations, sorghum/cowpea based 1052
Soy flour
storage stability of polyethylene packed lipoxygenase-free full-fat soy flour 1070
Soy meals
trypsin inhibitors measurement in soy meals 1071
Soy products
badi, low-cost technology for making soybean 1069
starch hydrolysis in extruded corn/soybean products 1040
Soy proteins
soybeans, protein analysis in 1230
Soybean oils
oil analysis in soybeans 1230
Soybeans
cookies, rice bran-soy blend supplementation in 1110
germination & chem. comp. of soybeans 1054
oil/protein analysis in soybeans 1230
processing & phytate levels in soybeans 1239
trypsin, acid + Cu & inactivation of soybean 1068
yoghurt-like products from soybean/skim milk/buttermilk solids 1117
Spectroscopy
coffee, water spectroscopic analysis in raw 1211
oils, petroselinic acid GC/13C NMR spectroscopic detn. in Umbelliflorae seed 1226
Spirits
asarone/quinine/coumarin/quassine in spirits 1005
Squash
polypropylene/polyethylene films & quality of fruit squash 1095
Stability
mutton, preparation/storage stability of dried salted 1175
pork, dietary vitamin E & stability of raw/cooked 1180
rice bran protein conc., moisture & storage stability of 1027
sorbic acid stability & NaCl aqueous solution 1020
soy flour, storage stability of polyethylene packed lipoxygenase-free full-fat 1070
sunflower nutmeats, shelf life stability of hydrocolloids coated confectionery 1074
Stabilizers
beverages, stabilizers & whey separation in fermented 1137
Staphylococcus aureus
milk fat/vegetable fat/emulsion, Staph. aureus in 1123
milk/milk products, pathogenic Staph. aureus in 1122
whey/whey cream/whey cream butter, Staph. aureus fate in 1159
Starch
DSC studies on heat-treated/enzyme resistant starch 1105
ESR/DSC & interactions of starch 1049
corn/soybean products, starch hydrolysis in extruded 1040
Storage
UHT milk, storage & flavour characteristics/volatile fatty acids in 1128
UHT milk, storage & viscosity/pH/oxygen content/sedimentation characteristics fat content in 1129
apple juices, storage & phenolic comp. of 1214
catfish, temp. & storage characteristics of 1194
grape juices, storage & phenolic comp. of Thompson seedless 1216
milk/curd, containers & acceptability trials of stored 1121
mutton, preparation of dried salted 1175
potatoes, storage temp. & lipoxygenase activity/carotenoid disappearance in 1080
rice bran protein conc. moisture & storage stability of 1027
sardines, bacteria & chilled sea water stored Indian oil 1199
soy flour, storage stability of polyethylene packed lipoxygenase-free full-fat 1070
Storage cold
tomatoes, cold storage & carbon dioxide diffusion in 1090
yoghurts, humectants/water activity & proteolysis/yeast/mould growth/shelf life of cold stored 1161
Storage frozen
cheese, frozen storage & physico-chem./sensory characteristics of goat's 1140
Storage modified atmosphere
tomatoes, cold storage & carbon dioxide diffusion in 1090
Sucrose
berry fruit juices, sucrose enzyme induced loss in 1213
Sugar
ESR/DSC & interactions of sugar water 1049
Sugar beet
air diffusion/ventilation for stored sugar beet roots 1077
Suitability
sandesh, packaging materials suitability for 1157
Sulphamethazine
dairy products, suplhamethazine M1 residues in 1115

Sulphides
fish, spoilage bacteria & volatile sulphides production in 1188
Sulphur dioxide
potatoes, sulphur dioxide & microbial growth in refrigerated pre-peeled plastic film packed 1081
Sunflower
nutmeats, shelf life stability of hydrocolloid-coated confectionery sunflower 1074
Sunflower meals
proteins of sunflower meals 1073
salt soluble proteins of sunflower meal 1072
Sunflower oils
location/climatic conditions & fatty acid comp. of sunflower seed oils 1231
Surimi
properties of surimi 1206
Sweets
nutritional value of milk-based sweets 1132
TBHQ
rapeseed oils, TBHQ & thermal stability in 1229
Tamarind
protein quality of tamarind 1053
Tannin
guarana seeds, tannin fractions in 1006
Tea
leaves, plucking & fatty acid distribution in tea 1217
rooibos tea extracts, chem./sensory analysis of spray-/freeze-dried 1219
rooibos tea, batch extraction conditions & polyphenols extraction from 1218
Technology
milk products, technology of Indian indigenous 1135
soybean badi, low-cost technology for making 1069
Tenderness
bulls/steers meat, pH & tenderness of 1172
Texture
Kamaboko gels, thermal processing/additives & texture of 1201
khoa, sensory/instrumental data & texture of 1152
Thermal conductivity
dairy products, line heat source method & thermal conductivity of 1116
Thermal processing
Kamaboko gels, thermal processing & texture of 1201
Thermal stability
rapeseed oils, TBHQ & thermal stability in 1229
Thiamines
temp. & thiamine degradation kinetics in aqueous system 1240
Tilapia
improved utilization of stunted tilapia 1203
muscle myofibrils, pepstatin-sensitive protease & changes in tilapia 1204
Tissue culture
food ingredients production from plant tissue culture 1016
Tomato powder
water binding behaviour of tomato powder 1091
Tomatoes
cold storage & carbon dioxide diffusion in tomatoes 1090
Transport
avoiding transport loss 990
sheep meat quality, preslaughter transport & carcass yield/indices of 1176
Tribolium castaneum
rice infested Tribolium castaneum, Acorus calamus insecticidal activity against milled rice infested 1026
Triglycerides
grape-ripening indices & triglycerides 1101
Trypsin inhibitors
red kidney beans, trypsin/chymotrypsin inhibitors purification/partial characterization from 1061
soy meals, trypsin inhibitors measurements in 1071
UHT milk
sensory changes & physico-chem. properties of UHT buffalo milk 1130
storage & flavour characteristics/volatile fatty acids in UHT milk 1128
storage & viscosity/pH/oxygen content/sedimentation characteristics/fat content in UHT milk 1129
Vegetables
dietary fiber comp. of Malaysian common vegetables 1084
foodstuffs, multielement X-ray fluorescence detn. in vegetable 1085
quality of vegetables 1092
Viscoelastic properties
corn starch, concn./temp./starch hydrolysates & viscoelastic properties of 1047
rice, protein disruption & viscoelastic properties of cooked 1024
Viscosity
UHT milk, storage & vicosity in 1129
Vitamin A
infant milk powder, vitamin A HPLC detn. in 1238
Vitamin E
pork, dietary vitamin E & stability of raw/cooked 1180
Vitamins
milk, khoa preparation & vitamin biological activity in 1150
Volatiles
pork fat, headspace volatiles from heated 1179
Water
coffee, water spectroscopic analysis in 1211
dried fruits, heat & water sorption in 1094
meat preblends, water/salt content & protein solubility/water retention of 1171
Weaning foods
formulations, sorghum/cowpea based weaning food 1052
Wheat
chapati making quality & Indian wheats, review 1028
corn-wheat based pasta making process optimisation 1046
flour properties of Klassic hard white wheat 1031
glutenin subunits, wheat low molecular wt. 1036
identification of wheat var. 1030
physico-chemical/rheological characteristics of Indian Triticum dicoccum 1029
Wheat bran
proanthocyanidins in wheat bran 1033
Wheat flour
doughs, rheology of low/intermediate moisture whole wheat flour 1034
flour properties of Klassic hard white wheat 1031
Wheat proteins
PAGE & salt-soluble proteins of

US soft wheats 1037
wheat granule surface proteins 1035
Wheat starch
wheat granule surface proteins 1035
Wheys
Staph. aureus fate in whey/whey cream/whey cream butter 1159
beverages, stabilizers & whey separation in fermented 1137
precipitation of solids in wheys 1158
Xanthosoma
leaves, protein nutritive value in xanthosoma 1087
Yam
processing & phytate levels in yams 1239
Yeast brewer's
brewing, brewer's yeast glucosidase in high gravity 1207
Yeasts
beer, immobilized yeast reactor & fermentation of 1208
chymosin evaluation from genetically engineered Kluyveromyces lactis 1008
yoghurts, humectants/water activity & yeast in cold stored 1161
Yoghurt-like products
soybean/skim milk/buttermilk solids, yoghurt-like products manufacture from 1117
Yoghurts
LP-system & manufacture of Mozzarella cheese 1136

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